Results of Preliminary Investigations and Sampling in Proposed New Jersey Turnpike Right-of-Way at the Bayonne Barrel and Drum Property

Newark, New Jersey

Submitted to:

New Jersey Turnpike Authority

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1.0 INTRODUCTION

The New Jersey Turnpike Authority (NJTA) in anticipation of the need to acquire the property of Bayonne Barrel and Drum (BB&D), has initiated through their consultant, Louis Berger & Associates, a preliminary investigation of the site to determine its potential for environmental contamination.

The BB&D property has been identified by USEPA as an unpermitted hazardous waste storage facility (in violation of 40 CFR 264.34(a)). This subjects it to a consent order requiring the owner to establish the extent of contamination and to provide for its cleanup through an approved closure plan (see Appendix A for the consent agreement and the USEPA's investigations). The satisfactory completion of this process may be required to satisfy ECRA.

The scope of the investigation conducted by Louis Berger & Associates, Inc. was limited to a reconnaissance level soil and groundwater sampling program. The samples were taken either on, or in, close proximity to the proposed right-of-way and were tested for 127 priority pollutants plus 40 other possible pollutants. The priority pollutants are a broad cross-section of chemicals designated as toxic pollutants under Section 307(a)(1) of the Clean Water Act.

The results of the site reconnaissance were intended to indicate the areal extent of contamination in the proposed right-of-way and whether the levels of contamination require a site cleanup. It did not cover portions of the property not under consideration by the NJTA for the 1985-90 widening project.

This report provides a description of the site, the methods of investigation, the results of analyses and their interpretation. The report is not intended to serve as a comprehensive working document for purposes of preparing plans and specifications for any required cleanup. For this reason no specific recommendations have been prepared.

2.0 SITE DESCRIPTION

Bayonne Barrel and Drum (BB&D) is located at 150 Raymond Boulevard in Newark, New Jersey. The property is bounded by Routes 1 and 9 on the west and north, the New Jersey Turnpike on the east, and the constuction site, previously the Newark Drive-In Movie Theater, on the south (see General Site Map, Figure 1). The site consists of three tracts designated 1, 2, and 3 which correspond to the land ownership as indicated by the City of Newark. Tract 1 is approximately 11 acres and encompasses the buildings, operations, storage areas, a shredded tire pile and the proposed right-of-way. Tract 2, located in the southeast part of the site, is 5 acres. It contains empty drums, an ash pile and other refuse. Tract 3, owned by the Turnpike Authority and adjacent to the Turnpike right-of-way, is 1.4 acres. It is partly covered by a pile of shredded tires.

2.1 Site Characteristics

The BB&D site is characterized by its location in an old flood-plain of the Passaic River. Topographically, the site is relatively flat with a slight undulating slope towards the east and northeast. Elevations on the property range from approximately 10 to 15 feet above sea level. Drainage follows the topography and empties into drains that traverse the eastern border of the site near the Turnpike's fence. The stormwater sewer system drains into the Passaic River. There is no natural surface water on the site.

The site currently contains a number of buildings which were utilized for drum reconditioning, an incinerator, above ground and underground storage tanks, shredded tire piles and a large empty drum storage area (Figure 1).

2.2 Current Owner/Operator

Tract 1 is owned and operated by Bayonne Barrel and Drum Company, Inc. The five acre Tract 2 is owned by the BB&D's principal owner Frank Langella, but is utilized as part of the BB&D facility. The Bayonne Barrel and Drum Company, Inc. filed a petition under Chapter 11 of the Bankruptcy Code (11 U.S.C. 101, et seq.) on July 13, 1982. The 1.4 acre Tract 3, is owned by the NJTA.

2.3 Status of the Property

Bayonne Barrel and Drum Company was a reconditioner of storage drums. Since it filed for protection under the bankruptcy acts, a portion of the property has been leased and is used to repair and maintain trailers and cargo containers. Currently, the New Jersey Tire Pyrolysis System Company is seeking financial assistance from the Essex County Improvement Authority for the purpose of financing the acquisition of the land and existing buildings at BB&D. This company plans to operate a tire pyrolysis system to produce saleable products.

The previous site activities included the cleaning and reconditioning of drums using caustic solutions and incineration. These operations produced large amounts of spent solution, incinerator ash and sludge. The storage of these waste products, as well as the storage of the drums awaiting reconditioning, provide the potential for hazardous waste contamination.

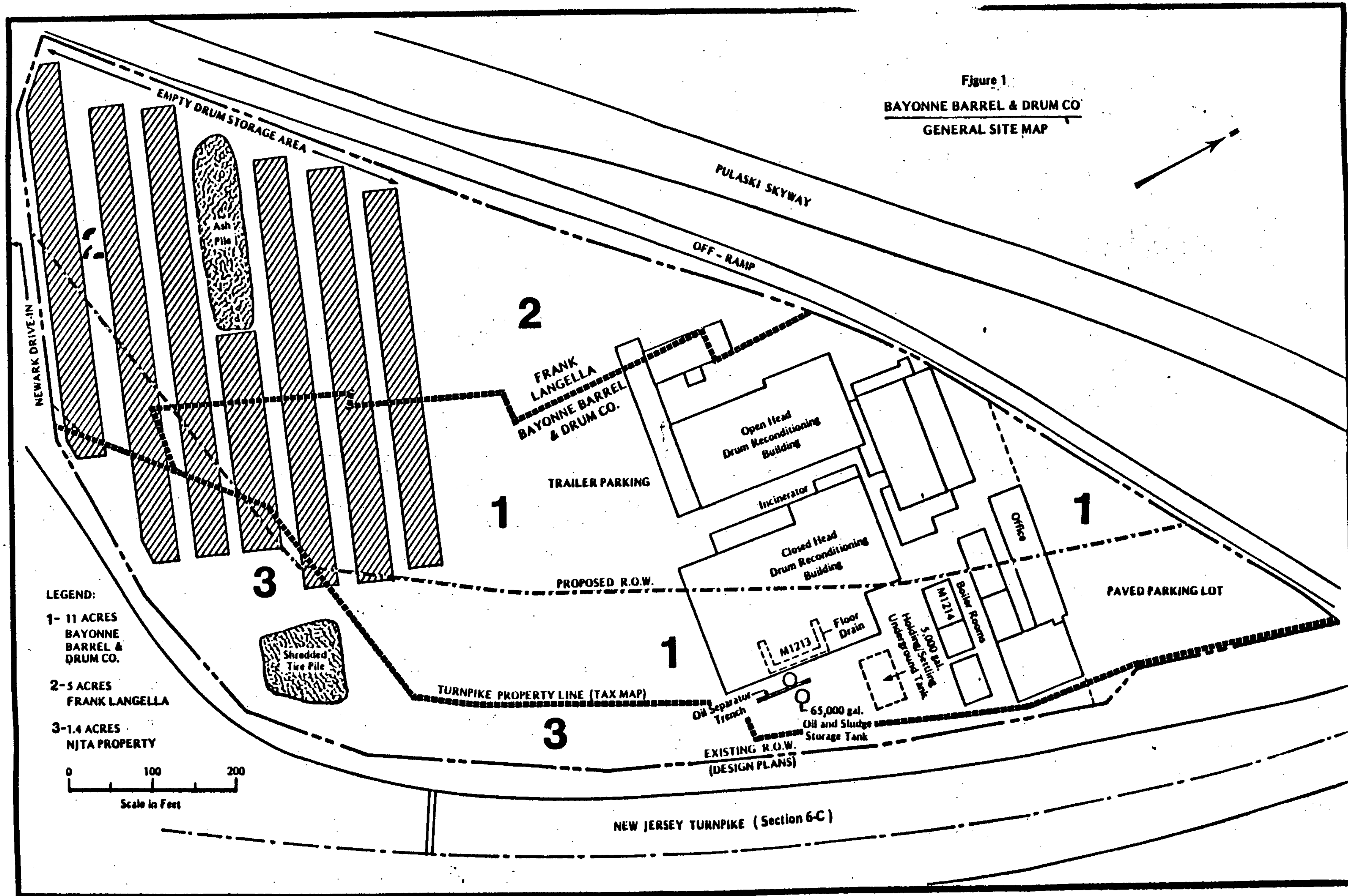


Figure 1
BAYONNE BARREL & DRUM CO
GENERAL SITE MAP
PULASKI SKYWAY
OFF - RAMP
EMPTY DRUM STORAGE AREA
Ash Pile
NEWARK DRIVE-IN
2
FRANK LANGELLA
BAYONNE BARREL & DRUM CO.
Open Head Drum Reconditioning Building
TRAILER PARKING
Incinerator
Office
1
1
Closed Head Drum Reconditioning Building
PROPOSED R.O.W.
3
PAVED PARKING LOT
Boiler Rooms
M1214
5,000 gal. Holding/Settling Underground Tank
Floor Drain
M1213
1
Shredded Tire Pile
TURNPIKE PROPERTY LINE (TAX MAP)
Oil Separator Trench
65,000 gal. Oil and Sludge Storage Tank
3
EXISTING R.O.W. (DESIGN PLANS)
LEGEND:
1- 11 ACRES BAYONNE BARREL & DRUM CO.
2- 5 ACRES FRANK LANGELLA
3- 1.4 ACRES NJTA PROPERTY
0
100
200
Scale in Feet
NEW JERSEY TURNPIKE (Section 6-C)

As the operator of the site did not have a permit required under the authority of the Resource Conservation and Responsibility Act (RCRA) to operate a hazardous waste storage facility, a consent order was issued by the USEPA (Docket No. II RCRA-82-0115) charging BB&D with violating Sections 3004 and 3005 of the Act (see Appendix A). The consent agreement accompanying the consent order required Bayonne Barrel and Drum to take the following actions:

1. Submit a detailed soil and aqueous sampling plan.

2. Remove all hazardous waste piles and contaminated soil.

3. Submit a groundwater monitoring plan to determine if contamination of groundwater occurred and the extent and direction of movement of any contaminated plume.

4. Submit a closure plan that satisfies the requirements of RCRA under 40 CFR 265.112, 40 CFR 265.197 and 40 CFR 265.351.

After the consent order was issued, BB&D hired Dan Raviv Associates, Inc. to conduct a soil and groundwater monitoring program. The original sampling plan that Dan Raviv & Associates proposed in October, 1984 was later modified to reflect comments by USEPA and NJDEP. The modifications were agreed to in an exchange of letters during the summer of 1985. Though this program has been initiated, the extent to which it has been implemented and any results that were obtained has not been made known. Although the site is being monitored by the USEPA Region II, no actions are known to have been taken to proceed with any site cleanup.

Other than the consent order and agreement, no other violations, permits or enforcement actions are known to be in effect or pending.

2.4 Historical Use

The area encompassed by the BB&D property is believed to have been part of the tidal marshes associated with the lower reaches of the Passaic River. At some time the area appears to have been covered with fill. It is not clear to what extent this fill was dumped as waste, and what was placed there for construction purposes. Historical maps and air photos indicate that parts of the area now occupied by the Bayonne Barrel and Drum company have been used for drum storage/reconditioning since at least 1931. Additionally, substantial portions of the site have also been utilized for waste disposal.

The earliest reference to a drum recycling facility at the site is a 1931 Sanborn Atlas of Newark which shows an industrial facility operating at a site owned by the B & F Co., Inc. However, the buildings are labelled "tenant occupied". Most buildings are shown to be storage buildings. Crate and drum storages are located east of the original site buildings, outside the current site boundaries. Two of the smaller buildings are labeled as "drum cleaning" areas (Figure 2, Area A). The 1939 Newark Directory lists the Bayonne Steel Drum company with James Allen as President. The 1942

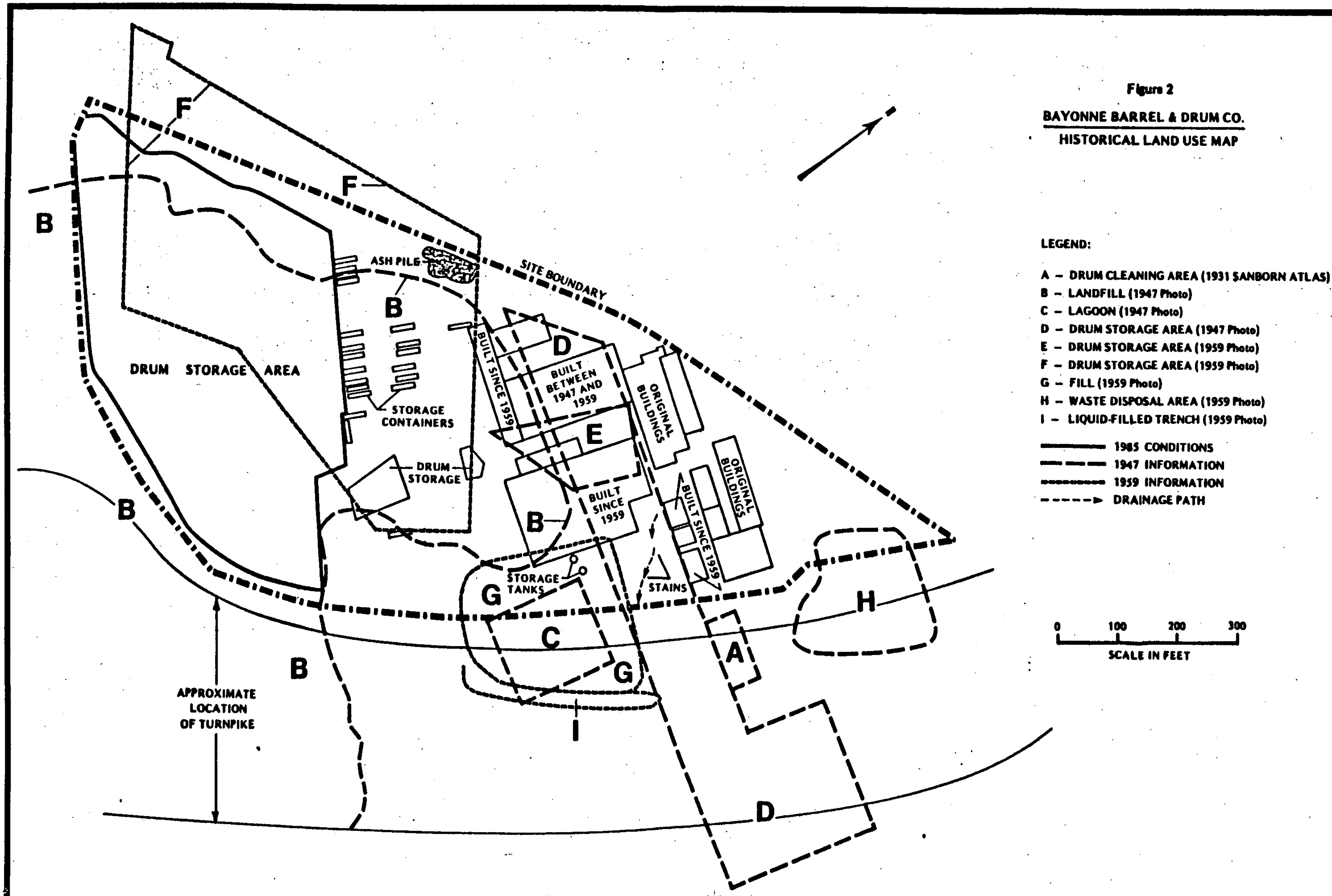


Figure 2

BAYONNE BARREL & DRUM CO.

HISTORICAL LAND USE MAP

Newark Directory shows the same company with Frank Langella (the current owner) and David Pacrulli as owners. A 1943 Newark Directory indicates that the establishment's name was changed to its current name of Bayonne Barrel and Drum Company, but the owners are still listed as Mr. Langella and Mr. Pacrulli.

Aerial photographs from 1947 to 1985 document physical changes at the site. Figure 2 graphicly displays these changes. Following is a chronologic narrative of the significant changes that have impacted the site's present environmental setting.

1947 - Aerial photographs taken on April 28, 1947 show that portions of an adjacent landfill covered the southern two thirds of the current site area (B). A short road provided access between the drum storage facility and the landfill. One waste lagoon (C) was observed at the site in a location which straddles the current eastern site boundary. Drainage channels connected the lagoon to drainage channels leading southeast to the Passaic River. A large open storage area (D) was located south of the site buildings. Several thousand drums were stored in this area and ground stains were seen surrounding the drum stacks. A substantial portion of areas C and D are now overlain by the Turnpike.

1959 - The construction of the New Jersey Turnpike (Interstate 95) altered the pattern of drum storage at the site. Photographs taken on April 15, 1959 show that drum storage E had been moved to the site's southwest corner extending slightly beyond the current site boundary. A new building has been constructed and a small concentration of drums (F) was noted east of that building. The lagoon (C) previously seen along the site boundary has apparently been filled in (G). Additionally, a small waste disposal area (H) was located in the northeast corner of the site. Drainage ditches at the eastern edge of the site apparently drained into a liquid-filled trench (I) adjacent to the old lagoon location.

1985 - Recent photographs (July 3, 1985) show that the areal extent of open drums has decreased only slightly from that used in 1959. Six new buildings were noted in the site's northern area, and several storage containers (possibly truck trailers) were observed north of the drum storage area. An area of dark staining, indicating a recent spill, was seen at the eastern edge of the site. Ground stains were also observed in the drum storage area. A large mound of dark material (possibly ash) was seen at the western edge of the site. Waste disposal previously seen in the northeast corner of the site (1959) was no longer evident.

PHOTO SOURCES:

April 28, 1947 - Black and white aerial photographs at an approximate scale of 1"=1000' from Robinson Aerial Surveys, Inc., Newton, NJ.

April 16, 1959 - Black and white aerial photographs at an approximate scale of 1"=1500' from Robinson Aerial Surveys, Inc., Newton, NJ.

July 3, 1985 - Black and white aerial photograph at an approximate scale of 1"=1000' from HNTB engineering plans for 1990 NJ Turnpike widening.

3.0 METHODS OF INVESTIGATION

The methods employed during this reconnaissance level investigation consisted of establishing site safety practices prior to working on the site; developing a sampling plan, and sampling methodology; and establishing a quality assurance program. The methods used were selected based upon their compliance with NJDEP recommended guidelines for hazardous waste site investigations.

3.1 Site Safety Practices

A Site Safety Plan was developed prior to the commencement of any site activity, (refer to Appendix B). The Site Safety Plan establishes the policies and procedures that protect workers from the potential hazards posed by site investigative activities at a hazardous waste site. To minimize accidents and injuries that may occur during site activity, the plan addresses such practices as decontamination procedures, the use of personal protective equipment, and the type of air monitoring techniques employed during site operations.

3.1.1 Air Quality Monitoring

During the initial site investigation it was necessary to determine whether or not the workers were exposed to an imminent hazard. To characterize the atmospheric conditions at the site various parameters were measured with the use of air monitoring equipment.

At the time of the initial reconnaissance, a walk-through inspection of the site was conducted, using direct-reading instruments to identify and quantify airborne contaminants. The investigators monitored for combustible gases, oxygen levels, radiation levels and total organic vapors.

After the initial survey, workers continued to monitor for the presence of organic vapors only, as the other parameters had not been detected or were within safe levels during the walk-through survey.

The total organics were measured with an Hnu Model Pl-101 Photoionization Detector (PID). The analyzer is calibrated to benzene and reads out in deflection units or parts per million (ppm) relative to benzene.

The PID was used for measuring the ambient atmosphere as well as for screening all soil and groundwater boreholes. In both cases, it was used as a monitoring device for identifying worker exposure levels, thereby supplying the measurements needed for the determination of personnel protection. Measurements of the ambient atmosphere ranged from 0.10 to 0.20 ppm.

Of the thirteen (13) borehole locations measured, only one location showed a significant reading of 100-125 deflection units on the PID. This was in Sampling Area C on Figure 3.

A Foxboro Century Organic Vapor Analyzer (OVA), with a flame ionization detector, was also used as a screening device for the measurement of organic vapors during well development. During the drilling of monitoring well #2, OVA readings reached 400 deflection units.

3.1.2 Personnel Protection Equipment

The determination of protection levels was made by the Site Safety Officer. The information that aided in making the decision was the air quality measurements, the type of work being performed and the visual evidence of known and suspected hazards.

Based on PID measurements in ambient air, field personnel were suited to Level D protection. During the drilling of monitoring well #2, the field personnel suited up to Level C. This required the use of a half-face respirator with a particulate filter.

3.1.3 Decontamination Procedures

When leaving a site all personnel were required to decontaminate themselves and dispose of all nonreusable equipment. Boots were scrubbed clean on site with soapy water and dried. Tyvek suits and gloves, and air cartridges and filters were disposed of in trash bags. Exposed skin was washed with soap and water. All wash water was disposed of on-site.

3.2 Sampling Plan

For the reconnaissance-level investigation conducted, sampling of soils and of groundwater was planned. The sampling locations for both soils and groundwater are shown on Figure 3. The soil sampling sites are designated by a five character alpha numeric code. The groundwater monitoring wells are identified as MW2 and MW3. Well MW1 occurs on the adjacent drive-in movie property which is not addressed in this report. The rationale for sample locations and the methodology employed for soil sampling and for groundwater sampling are discussed in the following sections as well as the physical description of the material encountered during sampling.

3.2.1 Soils

The determination of the soil sampling points was based on both random and biased sampling. Random sampling methodology was employed for all the discrete samples that were taken and the composite sample locations were chosen by biased sampling. The random sampling methodology was performed by dividing the area at BB&D that is within the Turnpike's proposed right-of-way into a grid of 30 blocks, assigning numbers to each block, and then statistically selecting blocks for sampling point location by using a table of computer generated random numbers. When the number of matching numbers equalled the predetermined number of samples to be taken, the process was stopped. For the purpose of preparing the sampling plan no division was made between property currently owned by NJTA and that owned by Bayonne Barrel & Drum. The area within the fenceline is being operated as a single entity irrespective of property lines and the purpose of the investigation was to determine the level of contamination in the construction area.

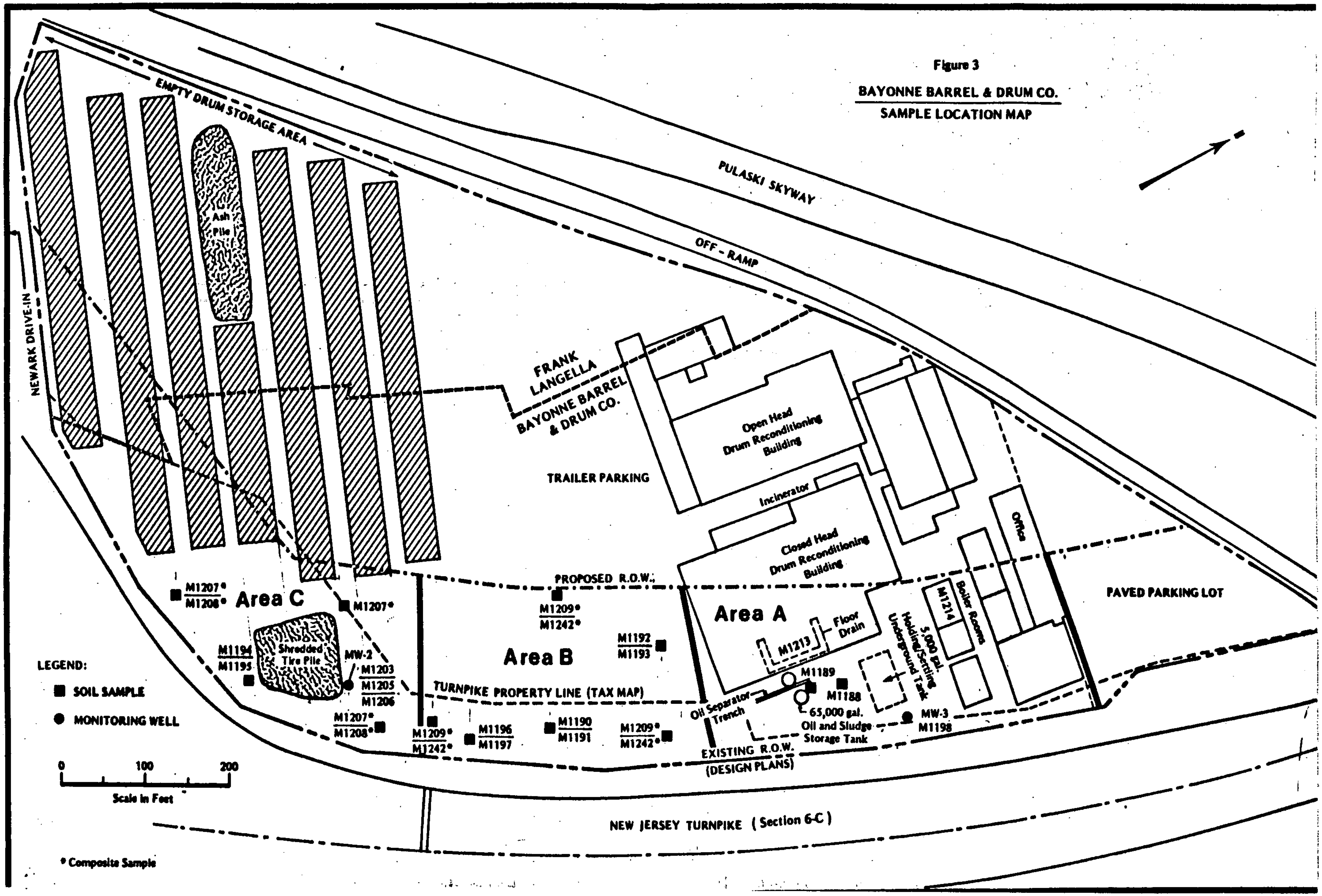


Figure 3
BAYONNE BARREL & DRUM CO.
SAMPLE LOCATION MAP
PULASKI SKYWAY
OFF - RAMP
EMPTY DRUM STORAGE AREA
Ash Pile
NEWARK DRIVE-IN
FRANK LANGELLA
BAYONNE BARREL & DRUM CO.
TRAILER PARKING
Open Head Drum Reconditioning Building
Incinerator
Closed Head Drum Reconditioning Building
Office
Boiler Rooms
M1214
5,000 gal. Holding/Settling Underground Tank
PAVED PARKING LOT
PROPOSED R.O.W.
Area A
Area B
Area C
Floor Drain
M1213
M1189
M1188
65,000 gal. Oil and Sludge Storage Tank
Oil Separator Trench
MW-3
M1198
M1207*
M1208*
M1207*
M1209*
M1242*
M1192
M1193
M1194
M1195
Shredded Tire Pile
MW-2
M1203
M1205
M1206
TURNPIKE PROPERTY LINE (TAX MAP)
M1207*
M1208*
M1209*
M1242*
M1196
M1197
M1190
M1191
M1209*
M1242*
EXISTING R.O.W. (DESIGN PLANS)
NEW JERSEY TURNPIKE (Section 6-C)
LEGEND:
SOIL SAMPLE
MONITORING WELL
0
100
200
Scale in Feet
* Composite Sample

The biased sample locations were selected due to site specific criteria: drainage, previous land use, and location of random samples. Nearly all surface and subsurface runoff within the proposed right-of-way flows to the storm sewer that transects the eastern border of the site. Therefore, any leachate emanating from the drums or ash pile as well as contaminants leaking from the surface and subsurface storage tanks in the northeast part of the site were intercepted by the soil borings.

The number of samples to be taken was based on a field investigation of the site, historical land use, and USEPA's investigations. Because the purpose of the site reconnaissance investigation was to determine whether the site is contaminated or not, and if so by what, it was decided to take 5 discrete samples at two different depths, 0-18 and 18-36 inches below land surface, for a total of 10 discrete samples. Two composite samples, comprised of three (3) different sample locations each at two distinct depths, were collected for a total of four composite samples. Due to local conditions, there were six discrete 0-18 inch samples taken and only four 18-36 inch samples. Of the four composite samples, one of the two 18-36 inch samples was comprised of only two samples.

Sediment samples, comprised of sediment collected from the floors, floor drains and scrapings off the walls of the buildings, were taken from locations inside the closed drum reconditioning building and in the boiler room. Each building sample was composed of five separate samples.

Discrete or grab samples are retrieved at a single point. Composite samples are samples comprised of two or more discrete samples taken at several different horizontal or vertical locations. The composites at BB&D were taken at three different horizontal locations and composited in the laboratory where the analyses were performed.

Compositing is performed during site reconnaissance when the nature and the extent of the contamination is unknown. It allows for determining the general areal extent of contamination and the nature of the contamination without requiring extensive sampling. The disadvantages are that the compositing may reduce contaminant levels to safe levels. By diluting a contaminated sample with two relatively clean samples the source of contamination is unknown. Another disadvantage is that volatile chemicals in a sample are lost during the compositing process. Compositing is never used when point specific chemical data is needed. Therefore, by discriminately using both discrete and composite samples, the general areal nature and extent of the contamination was able to be assessed. The vertical sampling at 0-18 and 18-36 inches below ground surface was intended to demonstrate whether only the surface material was contaminated, or if vertical migration of contaminants had occurred.

The actual number of composite samples was greatly reduced with respect to the sampling plan originally proposed. Discussions with NJDEP officials indicated a strong reluctance to accept results from composite samples due to the problems stated above. The sampling method adopted presented the best compromise between obtaining a sufficiently wide coverage of the area while having a reasonable number of discrete samples to support our findings to NJDEP.

Discrete soil samples were also taken during installation of the monitoring wells at depths above and below the water table. It was decided to limit the number of samples analyzed to six from both the Bayonne Barrel & Drum and the Newark Drive-In Movie Site. Therefore, 24 inch samples were taken every five feet and examined. Based on this, the following four samples were analyzed and the remainder discarded. At monitoring well #3 only one sample was analyzed, from 0-18" below land surface (b.l.s.), because of the poor recovery below the water table. For monitoring well #2, three discrete samples were analyzed, one above the water table and two below the water table. The depths were 3-5 feet, 13-15 feet and 17 1/2-19 1/2 feet b.l.s., respectively. The boring logs for the monitoring well are presented in the Groundwater section.

3.2.1.1 Sampling methods

A split spoon was used to retrieve all soil samples, including those in the monitoring well boreholes. It is composed of carbide steel, and is 24 inches long with a 2-inch outer diameter. The method for collecting samples using the split spoon is as follows:

a. Assemble the sampler by aligning both sides of the barrel and then screwing on the bit on the bottom and the heavier head piece on top.

b. Place the sampler in a perpendicular position on the material to be sampled.

c. Drive the sampler utilizing a sledge hammer (140 lb. weight with a 30" drop when using the well rig for sampling in the boreholes).

d. Record the length of the tube that penetrated the material (also the number of blows needed to reach that depth when using the well rig).

e. Withdraw the sampler, and open it by unscrewing the bit and the head piece and then splitting the barrel.

f. Record the physical description of the material and place it into the appropriate sample containers.

g. Decontaminate sampler using procedures outlined in Appendix C. In some locations where the split spoon sampler could not penetrate the material, a motor driven auger was used to break up the material, and the sample was taken using dedicated plastic scoops. This normally occurred at the surface where compaction of the material was most severe.

A description of materials encountered at each sample site are shown in Table 1.

3.2.1.2 Sample containers

Soil samples were taken from the sampler and placed in containers that have been determined by the USEPA to be adequate for the types of analyses the

Table 1

SOIL BORING DESCRIPTIONS

A. Discrete Soil Samples

Boring #	Depth (Inches)	Soil Description
M1188	0-8	Black muck, some gravel; oily odor
M1189	0-18	Brown silt and gravel
M1190	2- 8	Dark brown silty sand; friable
	8-13	Dense silty sand, trace glass
	13-18	Dark black sandy silt, some fill (plastic, china, whitish silica based material)
M1191	18-24	Brownish, black silty sand; some fill (asphalt glass, plastic, waste concretions)
	24-30	Same with trace plastic
	30-36	Fill (slag, glass, iron/sand concretions); distinct petroleum odor.
M1192	0-18	Dense black sand and fill (plastic, brick, slag)
M1193	18-24	Black silt; some fill (brick, glass, cardboard)
	24-36	Same with asphalt and wood; moist
M1194	0-7	Gravelly, f-m sand, trace glass
	7-12	F-m brown sand
	12-17	C gravel and c-m white sand; moist
	17-18	Orange-brown silty clay; trace organic smears
M1195	18-26	F-m brown silty sand
	26-29	Same, trace asphalt-like material
	29-33	Fill (greyish-black asphalt-like material and coarse fragments with trace black smears)
	33-36	Dense sand and gravel; some conglomerate, moist
M1196	0-7	Brownish black silty sand, some gravel, little asphalt
	7-14	Same with some asphalt
	14-18	Reddish brown silt and fill (brick conglomerate, trace asphalt)
M1197	18-25	Black sandy clay and fill (asphalt, brick)
	25-31	Fill (brick, coarse fragments (>1.5"), concretions, trace plastic)
	31-36	Brownish black silt, little black smears and weathered brick. Distinct petroleum odor.

Table 1 (continued)

Boring #	Depth (Inches)	Soil Description
B. Composited Soil Samples		
M1207 (6A)	0-4	Dark brown silty sand, some slatey coarse fragments, trace asphalt-like material
	4-8	Same, but more orange-colored sand with little coarse fragments and trace glass.
	8-14	Same, some whitish sand with little black streaks, trace glass
	14-18	C white sand and m-c brown sand, trace black smears, little cemented, rusted fill; moist
M1208	18-24	Gravelly m-c brown sand
	24-30	C white sand, some orange brands & trace pebbles
	30-36	Same, some coarse fragments, trace black streak
M1207 (6B)	0-4	Greyish brown silty sand, trace orange-green streaks
	4-10	Same, black with some fill (glass and wood)
	10-18	Fill (Asphalt-like matrix, some white specks and orange material, trace wood and glass)
No 18-36 inch sample taken for composite M1208 at 6B.		
M1207 (6C)	0-8	Brownish, black silty sand, some coarse frags.
	8-15	Same, some broken brick and asphalt-like material. Slight petroleum odor.
	15-18	Orange, brown silty sand and gleyed silty sand, trace brick and black streaks.
M1208	18-24	Black sandy loam; distinct oily texture and odor
	24-30	Dense sandy loam, some fill (brick, plastic): distinct petroleum odor.
	30-33	Sandy loam and fill (glass, wood, asphalt-like material, paint streaks); distinct oily odor
	33-36	Same, little plastic, some wood, distinct odor
M1209 (7A)	0-6	Sandy loam; little orange streaks, brick; weak petroleum odor.
	6-12	Dense sandy loam, trace white flakes & black laminates; strong petroleum odor.
	12-18	Fill (asphalt-like material, white flakes, green and red streaks, glass, sand concretions).
M1242	18-22	Black sand, some pebbles and fill (asphalt-like material, plastic, glass)
	22-30	Fill (glass, pebbles, wood fibers, green marl, brick
	30-36	Same, little dense red clay, petroleum-saturated

Table 1 (continued)

Boring #	Depth (Inches)	Soil Description
M1209	0-4	Black sandy loam, trace small pebbles; friable
(7B)	4-8	Same, some fill (Slag, brick and glass)
	8-14	Same, little rainbow colored bands; moist
	14-18	Fill (asphalt-like material); trace oily odor.
M1242	18-24	Fill (same, but little wood); slight oily odor
	24-30	Fill (asphalt-like material, white coatings, spongy material, sand and other)
	30-36	Same, all black trace-white coatings. Weak oily odor.
M1209	0-10	Black sandy silt and m-c gravel
(7C)	10-14	Fill (asphalt-like substrate, trace slag)
	14-18	Same, little orange coated slag; distinct petroleum odor.
M1242	18-24	Fill (wood fibers, asphalt-like material, glass, slag); moist; distinct petroleum odor.
	24-30	Same
	30-36	Same, some brick

sample is to undergo. These containers and the types of analyses they are appropriate for are defined by EPA in 40 CFR part 136 for aqueous samples and EPA's manual of Test Methods for Evaluating Solid Waste (SW 846; July 1982) for soil/sediment samples. The sample containers were prepared by Environmental Testing and Certification (ETC), the analytical laboratory used, and placed in preconfigured insulated and cooled shuttles.

The soil samples at BB&D were analyzed for 127 priority pollutants plus the next 40 highest peaks that were detected on the gas chromatograph. "Peak" is the parameter that defines concentration. By allowing for analysis of forty constituents that might have escaped detection if only target chemicals were specified, greater flexibility was incorporated into the analytical plan.

The term "priority pollutants" describes the pollutants' relative frequency of occurrence at potential hazardous waste sites, and represents a cross-section of inorganic and organic chemical groups. The 127 priority pollutants are the substances designated as toxic pollutants under Section 307(a)(1) of the Federal Clean Water Act (43 CFR 4108, January 1978), and are depicted in Table 2. In this table, NPDES is an abbreviation for National Pollutant Discharge and Elimination System. CAS stands for the Chemical Abstract Service, while MDL is the Minimum Detection Limit for each compound, measured in micrograms (10^{-6} grams) per liter of sample being tests.

3.2.2 Groundwater

Samples of groundwater on the BB&D site were obtained from two wells along the eastern boundary. The objective in locating these two wells was two-fold: first, to ascertain whether groundwater contamination existed, and second, to see if there were noticeable differences in the nature and degree of contamination. If there were marked differences in either of the two factors, one or all of the following conditions may exist: different sources of contamination (i.e. leaking drums or leaching ash piles), unconnected hydrologic systems, or varying proximities to a single contaminant source. Both wells were downgradient of the potential contaminant sources on the site. Background conditions or the exact direction of groundwater flow could therefore not be determined. This data is not needed until contamination has been verified. If contamination is detected, then at a minimum the installation of an upgradient well and one more downgradient well will be needed.

3.2.2.1 Monitoring Well Installation

The installation of both monitoring wells 2 and 3 was performed in accordance with NJDEP's Bureau of Groundwater Management recommended procedures. Though not required for this investigation, adhering to these procedures will insure their acceptance as New Jersey Pollutant Discharge Elimination System (NJPDES) monitoring wells, should the site prove to have contaminated groundwater. A NJPDES permit is required by owners/operators of sites that have the potential to be discharging effluent (i.e., contaminated leachate) to the groundwater.

Table 2

PRIORITY POLLUTANT LIST

I. VOLATILE PARAMETERS

NPDES Number	CAS Number	Compound	MDL (ug/l)
1V	107-02-8	Acrolein	100
2V	107-13-1	Acrylonitrile	100
3V	71-43-2	Benzene	4.4
4V	542-88-1	bis(Chloromethyl)ether	10
5V	75-25-2	Bromoform	4.7
6V	56-23-5	Carbon tetrachloride	2.8
7V	108-90-71	Chlorobenzene	6.0
8V	124-48-1	Chlorodibromomethane	3.1
9V	75-00-3	Chloroethane	10
10V	110-75-8	2-Chloroethylvinyl ether	10
11V	67-66-3	Chloroform	1.6
12V	75-27-4	Dichlorobromomethane	2.2
13V	75-71-8	Dichlorodifluoromethane	10
14V	75-34-3	1,1-Dichloroethane	4.7
15V	107-06-2	1,2-Dichloroethane	2.8
16V	75-35-4	1,1-Dichloroethylene	2.8
17V	78-87-5	1,2-Dichloropropane	6.0
18V	542-75-6	cis-1,3-Dichloropropylene	5.0
19V	100-41-4	Ethylbenzene	7.2
20V	74-83-9	Methyl bromide	10
21V	74-87-3	Methyl chloride	10
22V	75-09-2	Methylene chloride	2.8
23V	79-34-5	1,1,2,2-Tetrachloroethane	6.9
24V	127-18-4	Tetrachloroethylene	4.1
25V	108-88-2	Toluene	6.0
26V	156-60-5	1,2-Trans-dichloroethylene	1.6
27V	71-55-6	1,1,1-Trichloroethane	3.8
28V	79-00-5	1,1,2-Trichloroethane	5.0
29V	79-01-6	Trichloroethylene	1.9
30V	75-69-4	Trichlorofluoromethane	10
31V	75-01-4	Vinyl Chloride	10

II. ACID PARAMETERS

1A	95-57-8	2-Chlorophenol	3.3
2A	120-83-2	2,4-Dichlorophenol	2.7
3A	105-67-9	2,4-Dimethylphenol	2.7
4A	534-52-1	4,6-Dinitro-o-cresol	24
5A	51-28-5	2,4-Dinitrophenol	42
6A	88-75-5	2-Nitrophenol	3.6
7A	100-02-7	4-Nitrophenol	2.4
8A	59-50-7	p-Chloro-m-cresol	3.0
9A	87-86-5	Pentachlorophenol	3.6
10A	108-95-2	Phenol	1.5
11A	88-06-2	2,4,5-Trichlorophenol	2.7

Table 2 (continued)

III. BASE NEUTRAL PARAMETERS

NPDES Number	CAS Number	Compound	MDL (ug/l)
1B	83-32-9	Acenaphthene	1.9
2B	208-96-8	Acenaphthylene	3.5
3B	120-12-7	Anthracene	1.9
4B	92-87-5	Benzidine	44
5B	56-55-3	Benzo(a)anthracene	7.8
6B	50-32-8	Benzo(a)pyrene	2.5
7B	205-99-2	3,4-Benzofluoranthene	4.8
8B	191-24-2	Benzo(ghi)perylene	4.1
9B	207-08-9	Benzo(k)fluoranthene	2.5
10B	111-91-1	bis(2-Chloroethoxy)methane	5.3
11B	111-44-4	bis(2-Chloroethyl)ether	5.7
12B	39638-32-9	bis(2-Chloroisopropyl)ether	5.7
13B	117-81-7	bis(2-Ethylhexyl)phthalate	2.5
14B	101-55-3	4-Bromophenyl phenyl ether	1.9
15B	85-68-7	Butyl benzyl phthalate	2.5
16B	91-58-7	2-Chloronaphthalene	1.9
17B	7005-72-3	4-Chlorophenyl phenyl ether	4.2
18B	218-01-9	Chrysene	2.5
19B	53-70-3	Dibenzo(a,h)anthracene	2.5
20B	95-50-1	1,2-Dichlorobenzene	1.9
21B	541-73-1	1,3-Dichlorobenzene	1.9
22B	106-46-7	1,4-Dichlorobenzene	4.4
23B	91-94-1	3,3'-Dichlorobenzidine	16.5
24B	84-66-2	Diethyl phthalate	1.9
25B	131-11-3	Dimethyl phthalate	1.6
26B	84-74-2	Di-n-butyl phthalate	2.5
27B	121-14-2	2,4-Dinitrotoluene	5.7
28B	606-20-2	2,6-Dinitrotoluene	1.9
29B	117-84-0	Di-n-octyl phthalate	2.5
30B	122-66-7	1,2-Diphenylhydrazine	10
31B	206-44-0	Fluoranthene	2.2
32B	86-73-7	Fluorene	1.9
33B	118-74-1	Hexachlorobenzene	1.9
34B	87-68-3	Hexachlorobutadiene	0.9
35B	77-47-4	Hexachlorocyclopentadiene	10
36B	67-72-1	Hexachloroethane	1.6
37B	193-39-5	Indeno(1,2,3-c,d)pyrene	3.7
38B	78-59-1	Isophorone	2.2
39B	91-20-3	Naphthalene	1.6
40B	98-95-3	Nitrobenzene	1.9
41B	62-75-9	N-Nitrosodimethylamine	10
42B	621-64-7	N-Nitrosodi-n-propylamine	10
43B	86-30-6	N-Nitrosodiphenylamine	1.9
44B	85-01-8	Phenanthrene	5.4
45B	129-00-0	Pyrene	1.9
46B	120-82-1	1,2,4-Trichlorobenzene	1.9

Table 2 (continued)

IV. PESTICIDE PARAMETERS

NPDES Number	CAS Number	Compound	MDL (ug/l)
1P	309-00-2	Aldrin	1.9
2P	319-84-6	Alpha-BHC	10
3P	319-85-7	Beta-BHC	4.2
4P	58-89-9	Gamma-BHC	10
5P	319-86-8	Delta-BHC	3.1
6P	57-74-9	Chlordane	10
7P	50-29-3	4,4'-DDT	4.7
8P	72-55-9	4,4'-DDE	5.6
9P	72-54-8	4,4'-DDD	2.8
10P	60-57-1	Dieldrin	2.5
11P	115-29-7	Endosulfan I	10
12P	115-29-7	Endosulfan II	10
13P	1031-07-8	Endosulfan sulfate	5.6
14P	72-20-8	Endrin	10
15P	7421-93-4	Endrin aldehyde	10
16P	76-44-2	Heptachlor	1.9
17P	1024-57-3	Heptachlor epoxide	2.2
18P	53469-21-9	PCB-1242	36
19P	11097-69-1	PCB-1254	36
20P	11104-28-2	PCB-1221	30
21P	11141-16-5	PCB-1232	36
22P	12672-29-6	PCB-1248	36
23P	11096-82-5	PCB-1260	36
24P	12674-11-2	PCB-1016	36
25P	8001-35-2	Toxaphene	10

V. METAL PARAMETERS

1M	7440-36-0	Antimony, Total	32
2M	7440-38-2	Arsenic, Total	1.0
3M	7440-41-7	Beryllium, Total	0.3
4M	7440-43-9	Cadmium, Total	4.0
5M	7440-47-3	Chromium, Total	7.0
6M	7550-50-8	Copper, Total	6.0
7M	7439-92-1	Lead, Total	42
8M	7439-97-6	Mercury, Total	0.2
9M	7440-02-0	Nickel, Total	15
10M	7782-49-2	Selenium, Total	2.0
11M	7440-22-4	Silver, Total	7.0
12M	7440-28-0	Thallium, Total	1.0
13M	7440-66-6	Zinc, Total	2.0

VI. CONVENTIONALS

14M	57-12-5	Cyanide, Total	20
15M	-------	Phenols, Total	50

Courtesy of USEPA 1985

The borehole for installation of the monitoring wells was made by a hollow stem auger attached to a well rig. The auger was steam cleaned prior to use and between wells. It was scaled with chalk to every 6 inches to determine the sample depth. Samples were taken at the last two feet of every 5 foot segment (i.e. 3-5 feet, 8-10 feet below land surface). The results of the boring logs for the monitoring wells are in Appendix D. Both boreholes had distinct petroleum odors with significant amounts of tarlike material.

Approximate depth of hole and depth to water table were made using a weighted string. Borings were generally made to a depth of 10 to 12 feet below the water table. After the hole was bored to the desired depth, the augers were disconnected from the rig but left in the hole to support the sidewalls. The hole was flushed clean of soil cuttings using a roller bit and pressurized potable water. The flushing operation ceased when the water discharging from the hole was clean. The roller bit was then removed from the hole, and the well screen installed into the borehole with the hollow stem auger still in place. The 4 inch O.D. (outer diameter) PVC well screen had a plastic cap attached to its bottom and was threaded into a 4 inch O.D. well casing at its top before placing it into the borehole. The top of the casing rose to approximately two feet above the ground surface. The area between the borehole walls and the well screen (the annular space) was filled with #2 Morie sand to maintain a good hydraulic connection between the aquifer material and the well screen. The auger was slowly lifted out of the borehole as the annular space was being filled. Eventually the auger was removed and the sand was emplaced until it was 6-12 inches above the well screen. A bentonite/cement grout was then injected into the hole until it was flush with the ground surface, and a 6" O.D. steel casing placed over the inner casing and set into the sealant (bentonite/cement mixture). Next, the steel casing was locked and security posts were placed around the well. All materials and specifications for monitoring wells 2 and 3 are detailed in Appendix D along with their permits from the Bureau of Water Allocation.

3.2.2.2 Well Development

Well development took place soon after installation of the wells, in order to create a good hydraulic connection between the aquifer and the well screen. Development of a monitoring well can be accomplished by a variety of methods and equipment. A well is satisfactorily developed when pumping the well yields a sand-free discharge.

Monitoring well #3 was developed with a hand bailer until the well went dry. Its discharge was extremely turbid but did not contain much sand. Monitoring well #2 was developed by pumping with a suction pump for approximately 30 minutes at a rate exceeding 10 gpm. Its discharge was relatively turbid free.

3.2.2.3 Groundwater Sampling

Seven days after the wells were developed, but prior to their sampling for chemical analyses, samples were collected and tested for total organic carbon (TOC), and if turbid, for grain size distribution of the sediment. (Measuring these constituents is recommended by the USEPA for assessing the integrity of monitoring well installation and development on RCRA sites.)

The water was purged from each well using a bladder pump with a check valve for regulating discharge. The purge water for sediment size distribution was collected in glass containers, while the TOC samples were collected in the appropriate container and preserved. All containers and preservatives used for storing groundwater samples after collection were laboratory cleaned and composed of materials appropriate for the intended analyses in accordance with 40 CFR 136. The appropriate containers for each type of analyses is listed in Appendix C. The analyses for both parameters were performed the next day. The results of the grain size distribution and TOC analyses indicated that the majority of the purge water was silt, clay and organic material with very little sand.

Samples for chemical analyses were collected from the monitoring wells after evacuating a minimum of 3 times the volume of standing water in each well with a bladder pump. This was to insure that only fresh, nonstratified aquifer water was being sampled. The polyethylene tubing placed into each well for evacuation was dedicated to that well only. The depth to water and the depth of well were measured before sampling to determine the volume of water in each well using an oil/water interface meter.

Prior to and after evacuation of each well, field measurements were taken of several parameters that are usually considered controlling variables of the chemical speciation found in water quality analysis. The parameters are also signatures of the water that help determine whether the water recovered in a well is stable after evacuation, compared to the water previous to evacuation. The results of the field measurements are in Table 3. These parameters and the methods for measuring them are as follows:

- pH - A measure of the hydrogen ion concentration in the water. Measured with a Beckman 21 pH meter calibrated in the field with standard pH solutions of 4 and 7. Initial pH's were taken of water pumped from the well during purging (evacuation) and of the water collected from sampling. Water samples used for measuring pH were not kept for further chemical analyses.

- Salinity - Measures the total salt content in the water to determine whether it is fresh, brackish or saline. Measured in each borehole before purging and after sampling with a YSI #33 S-C-T meter. Neither well had saline water.

- Conductivity - An indirect measure of the total dissolved solids in solution. The measurements are in micromhos, a unit indicating the conductivity of the solution and therefore all ionized species. The micromhos units can be converted to mg/l of total dissolved solids by using a conversion factor (0.55 to 0.90) that is based on the source of the water and the types of charged chemical species that dominate the solution. Conductivity was measured the same way as salinity.

- Temperature - Measured in each borehole prior to purging but after sampling using the YSI S-C-T meter.

Table 3

FIELD MEASUREMENTS OF PARAMETERS AT
MONITORING WELLS 2 AND 3

	MW2	MW3
Date	5/27/86	5/27/86
Time	10:00 a.m.	1:27 p.m.
Water Level	3.67'	3.72'
pH (units)	7.24	8.35
Salinity (ppt)	1.0	0.5
Conductivity (micromhos/cm)	1,500	1,300
Temperature (°C)	14	19
Immiscible Layers		
Light Phase	No	No
Dense Phase	No	No
Total Organic Vapors (ppm)	400	350
Total Organic Carbon (mg/l)	61.5	37.5

Source: Louis Berger & Associates, 1986.

Immiscible Layer Measurements - Immiscible layers are concentrations of organic liquids that are insoluble in water and therefore form a distinct layer above the water table and/or at the bottom of a borehole. Where layers of either light or dense phase immiscibles are detected, separate samples of these layers will be taken. These measurements were made prior to purging and just before sampling with an oil/water interface sounding probe (Oil Recovery Systems - Interface Meter, Model 100EN/M) that transmits a steady beep when hitting an immiscible layer and in intermittent beep when in water.

Measurements in both monitoring wells indicated no distinct immiscible layers.

- Depth to water and depth of well measurements were made during development of each well, prior to evacuation, during recovery of the well and before and after sampling using the oil/water interface probe. Measurements were made to the nearest 0.01 foot.

All sampling of groundwater was performed using 36 inch long, teflon coated, single-bottom, check-valve bailers dedicated to each well. They were cleaned by the laboratory doing the chemical analyses and wrapped in autoclaved tinfoil. The wire used to rinse and lower each bailer was also teflon coated. The sampling procedures were as follows:

a) Each well was allowed to recover after purging, and sampling began when the water had risen to within 0.1 feet of water level prior to purging.

b) Each bailer was removed from tinfoil, tied to teflon coated wire which was connected to a circular spindle, and lowered into the corresponding well.

c) Volatile organics (VOA's) were sampled first by lowering the bottom of a bailer until it was entirely submerged below the water surface so as to sample any light phase immiscibles. Extreme care was taken when lowering and raising the bailer so as not to degas the sample. The sample was then transferred into the sample container by pushing the ball check-valve located at the bottom of the bailer upward with a finger and allowing the water to flow into the container. No air bubble or head space was left in the VOA containers.

d) The same method as (c) was used to collect samples for all other analyses but at depths in each well ranging from 18 to 48 inches below the water surface. Samples retrieved for metals analysis were first filtered through disposable 0.45 micrometer pore size cellulose acetate filters, and then stored in the appropriate containers and preserved. This is to minimize the effect that the sediment might have on the concentration of the metals in solution while the sample is awaiting analysis. The result of the analysis is reported as total dissolved metals.

e) After a sample was collected, depth of water, salinity, conductivity and temperature were measured and recorded. After removal of all probes, the plastic cap was fitted to the top of the inner casing and the steel protective casing was locked.

The groundwater samples collected and preserved were analyzed for the 127 priority pollutants plus 40 peaks. A listing of the priority pollutants categories are provided in Table 2 of Section 3.2.1.3.

3.3 Quality Assurance

The chain of custody is a quality assurance/quality control (QA/QC) measure to provide for the integrity of the sampling and analytical process. Chain of custody procedures were carried out in accordance with NJDEP and USEPA guidelines. The chain of custody forms used for each sample are contained in Appendix C.

All data on types of chemicals and their levels reported by ETC Laboratories have been critically evaluated with respect to data acceptance criteria which include accuracy, precision, representativeness, completeness and reliability. The evaluation was done according to NJDEP's guidelines for these criteria.

The data were found to meet these criteria with a few exceptions. The data are presented in the enclosed tables. Those data which did not meet the above mentioned criteria for acceptance are flagged with USEPA's data qualifier code letters. The qualifier codes are annotated and the code letters with annotations written next to the qualified data. Definitions of codes are presented at the bottom of Tables 5, 6 and 7 showing related data. Thus, concentrations of analytes flagged with code "J" are to be considered estimated concentrations.

The samples were analyzed for 127 priority pollutants plus 40 peaks. The tables show only those compounds which were "hits" in any of the samples. Compounds not detected in any sample are not included.

Data related to the volatile organic fraction meets our quality assurance criteria except for methylene chloride. Reported levels of methylene chloride are to be treated as estimated concentrations.

Data related to acids and base/neutral extractable compounds, metals, total phenolics and total cyanides meet acceptance criteria.

All concentrations reported for pesticides and PCB's are to be considered estimated concentrations. These compounds were found in the soil samples, but not in any of the water samples (see Tables 5, 6 and 7). The laboratory had difficulty in analyzing for these parameters due to matrix interference and had to repeat extraction and analyses. However, reextraction was done past the time limit allowed by NJDEP. The laboratory will obtain a decision from USEPA/NJDEP to allow acceptance of these results as valid. In the meantime these data could be used in characterization of the site.

4.0 RESULTS OF ANALYSES AND CONCLUSIONS

The sampling area has been divided into three sections for the purpose of relating chemical results to site characteristics. Area A covers the buildings, above and below ground tanks and the oil/water trench. Monitoring well #3 is in this area. Area B encompasses the dock area, trailer storage and the storm sewer system. No monitoring well is in this area. Area C includes the shredded tire pile, part of the storm sewer system, and is directly down gradient of the drum storage area. Monitoring well #2 is located in Area C.

Results of soil and water analyses from samples taken from the BB&D property are presented in Tables 5, 6 and 7 and correspond to Areas A, B and C, respectively. Table 4 depicts the cleanup level criteria used by the NJDEP's Bureau of Industrial Site Evaluation (BISE) to determine if a cleanup action should be taken. BB&D is currently being regulated by USEPA under RCRA, but the BISE cleanup levels provide a measure against which the results may be judged. Many of the parameters do not have specific criteria to be judged by, but instead are included in the totals for a whole group of contaminants that have a single cleanup level. Other parameters, such as acid extractable organics in soils do not have any clean-up criteria. The location of the results that exceed the BISE clean-up levels are summarized in Figure 4, along with their respective parameters.

Specific levels for many of the parameters in the USEPA Priority Pollutant List (Table 2) for both soil and groundwater are currently being developed, and may be applicable to this site when they are approved in the Federal Register.

As noted in Section 3.3 all concentrations reported for pesticides and PCB's are to be considered estimated or provisional. The analysis procedures did not meet USEPA and NJDEP Quality Assurance requirements. The laboratory will either have to obtain written confirmation from these agencies of their validity or resampling and reanalysis will be undertaken at the laboratory's expense. However, for the purpose of general description of contamination at the site they are considered valid, as the infringement was of a technical nature.

As previously indicated each sample was analyzed for the 127 "priority pollutants," a list of specific chemicals, and the results were fully quantified. In addition a search was made for other chemicals present with the highest concentration. Attempts were made to identify a total of up to 40 other chemicals, including 15 volatile organics, 15 base/neutral extractables, and 10 acid extractables. These concentrations are only reported in a semiquantitative form, and therefore only represent a rough estimate of the concentrations of the chemicals found.

The full laboratory analysis reports (NJDEP Tier II format) have been reviewed by our QA Coordinator and are maintained in our document control system. They are available for review upon request.

Table 4

CLEANUP LEVELS USED BY BISE

A. Soil	Concentration
Arsenic	20 mg/kg
Barium	400
Cadmium	3
Chromium	100
Copper	170
Lead	100
Nickel	100
Mercury	1
Petroleum Hydrocarbons	100
Polychlorinated Biphenyls	1-5**
Silver	5
Selenium	4
Total Cyanides	12
Total Volatile Organics	1
Zinc	350

B. Groundwater	Concentration
Petroleum Hydrocarbons	1 mg/l
Total Volatile Organics	10 ug/l*
Total Base/Neutral Organics	50 ug/l*
Total Acid Extractable Organics	50 ug/l*
Others	See Groundwater Quality Standards

*Lesser concentrations for specific chemicals may be utilized based upon 10^{-6} cancer risk and/or other toxicologic factors.

**USEPA does not regulate PCBs at concentrations of less than 50 mg/kg.

Table 4 (continued)

N.J.A.C. Groundwater Quality Standards

Primary Statewide/Toxic Pollutants

Pollutant, Substance or Chemical	Groundwater Quality Criteria
1. Aldrin/Dieldrin	1. 0.003 ug/l
2. Arsenic and Compounds	2. 0.05 mg/l
3. Barium	3. 1.0 mg/l
4. Benzadine	4. 0.0001 mg/l
5. Cadmium and Compounds	5. 0.01 mg/l
6. Chromium (Hexavalent) and Compounds	6. 0.05 mg/l
7. Cyanide	7. 0.2 mg/l
8. DDT and Metabolites	8. 0.001 ug/l
9. Endrin	9. 0.004 ug/l
10. Lead and Compounds	10. 0.05 mg/l
11. Mercury and Compounds	11. 0.002 mg/l
12. Nitrate-Nitrogen	12. 10 mg/l
13. Phenol	13. 3.5 mg/l
14. Polycholorinated Biphenyls	14. 0.001 ug/l
15. Radionuclides	15. Prevailing regulations adopted by the USEPA pursuant to sections 1412, 1415 and 1450 of the Public Health Services Act as amended by the Safe Drinking Water Act (PL 93-523)
16. Selenium and Compounts	16. 0.01 mg/l
17. Silver and Compounds	17. 0.05 mg/l
18. Toxaphene	18. 0.005 ug/l

Secondary Standards

19. Ammonia	19. 0.5 mg/l
20. Chloride	20. Natural Background
21. Coliform Bacteria	21. a) by membrane filtration, not to exceed four per 100 ml in more than one sample when less than 20 are examined per month, or b) by fermentation tube, with a standard 10 ml portion, not to be present in three or more portions in more than one sample when less than 20 are examined per month, or c) prevailing criteria adopted pursuant to the Federal Safe Drinking Water Act (PL 93-523)

Table 4 (continued)

Primary Statewide/Toxic Pollutants

Pollutant, Substance or Chemical	Groundwater Quality Criteria
22. Color	22. None Noticeable
23. Copper	23. 1.0 mg/l
24. Fluoride	24. 2.0 mg/l
25. Foaming Agents	25. 0.5 mg/l
26. Iron	26. 0.3 mg/l
27. Manganese	27. 0.05 mg/l
28. Odor and Taste	28. None Noticeable
29. Oil and Grease and Petroluem Hydrocarbons	29. None Noticeable
30. pH (Standard Units)	30. 5-9
31. Phenol	31. 0.3 mg/l
32. Sodium	32. Natural Background
33. Sulfate	33. Natural Background
34. Total Dissolved Solids	34. Natural Background
35. Zinc and Compounds	35. 5 mg/l

Source: N.J.A.C. 7:9-6.6

4.1 Soils

Area A

Priority pollutant heavy metals were the most significant contaminants in all three soil samples (M1188, M1189 and M1198) in Area A. Samples M1188 and M1189 had levels of cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg) and zinc (zn) all exceeding BISE cleanup levels (Cr in sample M1188 was 99 mg/kg which is 1 mg/kg below the cleanup level). Sample M1198 had only excessive levels of lead with all other priority pollutant metals below cleanup levels.

The source of these metals may be from the impurities in the reconditioned steel drums which are removed during the incineration process. The ash from the incineration concentrates these metals which can then be leached. Other sources can be from the drum reconditioning building and overflows from the oil/water trench which also contains metal from the incinerator leachate. The levels found in LB&A's investigation are lower than those detected by the USEPA analysis of the ash pile and soils near the incinerator but consistent with those findings (see Appendix A). Where metal concentration in ash and incinerator soil was in the hundreds to thousands (mg/Kg) the soil near the settling and holding tanks was in the tens to hundreds (mg/kg) range.

Area A had surficial soils (0-24") with excessive levels of organic contaminants. The organics in high concentration were polycyclic aromatic hydrocarbons (PAHs) and phthalates from the base/neutral extraction group. The total concentration of all priority pollutant base/neutral organics exceeded 110 mg/kg (see Table 5), with the phthalates comprising over 85% of the total. When additional peaks of the non-priority pollutants are figured in the total, the diversity of organic compounds increases to include other aliphatic and monocyclic aromatic hydrocarbons besides phthalates. In sample M1188, alkanes, a group of aliphatic hydrocarbons registered at over 76 mg/kg, while total monocyclic aromatic hydrocarbons which includes the tri and dimethyl benzenes exceeded 58 mg/kg. Both of these classes of chemicals were conspicuously absent in sample M1189 which is only 30 feet south of M1188. Sample M1198, taken from the first two feet of soil of monitoring well #3, also had low levels of nonpriority pollutants, except for alkanes, which were over 2.6 mg/kg. (Note: Results of non-priority pollutants are semiquantitative and useful only in indicating their presence and general level of concentration.)

There are no BISE criteria for cleanup levels of base/neutral extractables in soil, but polycyclic aromatic hydrocarbons are either known or suspected carcinogens and are included in the range of constituents found in sample M1188. There were no other excessive levels of contaminants in any of the soil samples in Area A, except for PCB's in sample M1188, at a concentration of 19.1 mg/kg. The BISE cleanup criteria for PCB's in soils is 1-5 mg/kg while USEPA does not regulate PCBs with a concentration of less than 50 mg/kg.

TABLE 5
SUMMARY OF AREA A CHEMICAL ANALYSIS RESULTS

Sample #	M1188	M1189	M1198	M1213	M1214	M1215
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	25-Apr	25-Apr	05-May	26-Apr	26-Apr	27-May
Depth	0-18"	0-18"	0-2'			
Composite/Discrete	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	X	X	W
VOLATILE ORGANICS						
PRIORITY POLLUTANTS						
Benzene	ND	ND	ND	NA	NA	ND
cis-1,3-Dichloropropylene	ND	ND	ND	NA	NA	ND
Ethylbenzene	28.10 J2	ND UJ1	ND UJ1	NA	NA	ND UJ2
Methylene chloride	158	ND	ND	NA	NA	ND
Tetrachloroethylene	ND	ND	ND	NA	NA	ND
Toluene	33	2	ND	NA	NA	ND
Totals	219.1	2	0	NA	NA	0
ADDITIONAL PEAKS (SEMI-QUANTITATIVE)						
2-Methyl hexane	ND	ND	ND	NA	NA	ND
2-Pentanone, 4-Methyl	ND	ND	ND	NA	NA	ND
2-Propanones	ND	ND	ND	NA	NA	ND
3-methyl benzene	ND	ND	ND	NA	NA	ND
3-Methyl pentane	ND	ND	ND	NA	NA	ND
4-Ethyl 2-Pentanone	ND	ND	ND	NA	NA	ND
4-Methyl 2-Pentanones	ND	ND	ND	NA	NA	ND
Acetone	ND	ND	ND	NA	NA	ND
Alkanes	50	ND	ND	NA	NA	ND
Alkyl benzene	ND	ND	ND	NA	NA	ND
Benzene ethenyl-methyl	ND	ND	ND	NA	NA	ND
Benzene, 1,2,3-trimethyl	ND	50	ND	NA	NA	ND
Cycloheptane, methyl	89	ND	ND	NA	NA	ND
Cyclohexanes, 1,1,3-trimethyl	ND	ND	ND	NA	NA	ND
Cyclohexane, 1,1-dimethyl	76	ND	ND	NA	NA	ND
Cyclohexane, 1,3-dimethyl	64	ND	ND	NA	NA	ND
Cyclohexanes, 1,3-dimethyl, cis	ND	ND	ND	NA	NA	ND
Cyclohexanes, 1,3-dimethyl,trans	ND	ND	ND	NA	NA	ND
Cyclohexane,1,1,3-trimethyl	ND	ND	ND	NA	NA	ND
Cyclohexane,1,2-dimethyl,cis	ND	ND	ND	NA	NA	ND
Cyclohexane,1,2-dimethyl,trans	ND	ND	ND	NA	NA	ND
Cyclohexane,1,3-dimethyl,trans	ND	ND	ND	NA	NA	ND
Cyclohexane,1,4-dimethyl,cis	ND	ND	ND	NA	NA	ND
Cyclohexane,1-ethyl-4-methyl cis	ND	ND	ND	NA	NA	ND
Cyclohexane,1-ethyl-4-methyl trans	ND	ND	ND	NA	NA	ND
Cyclohexanone, 3,3,5-trimethyl	ND	ND	ND	NA	NA	ND
Cyclooctane, butyl	176	ND	ND	NA	NA	ND
Cyclopentane, methyl	ND	ND	ND	NA	NA	ND
Cyclopentane,1,3-dimethyl,trans	ND	ND	ND	NA	NA	ND
Dimethyl benzenes	ND	ND	ND	NA	NA	ND

J2= Estimated concentration due to %RDS for response factor in inital calibration higher than 30%
ND = Not Detectable
UJ1 = Estimated quantitation limit 13ug/kg
UJ2 = Estimated quantitation limit 16.3ug/l

NA = Not analyzed for this parameter

TABLE 5 (CONTINUED)
SUMMARY OF AREA A CHEMICAL ANALYSIS RESULTS

Sample #	M1188	M1189	M1198	M1213	M1214	M1215
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	25-Apr	25-Apr	05-May	26-Apr	26-Apr	27-May
Depth	0-18"	0-18"	0-2'			
Composite/Discrete	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	X	X	W
VOLATILE ORGANICS ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED						
dimethyl cyclohexane	ND	ND	ND	NA	NA	ND
Dimethyl cyclopentane	ND	ND	ND	NA	NA	ND
Dimethyl-3-hexene	ND	ND	ND	NA	NA	ND
Ethane, 1,1'-oxybis	ND	ND	ND	NA	NA	ND
Ethyl-methyl benzene	ND	ND	ND	NA	NA	ND
Heptane, methyl	ND	ND	ND	NA	NA	ND
Hydrocarbons	ND	ND	ND	NA	NA	ND
Methyl cyclohexane	ND	ND	ND	NA	NA	ND
m-Xylenes	ND	ND	ND	NA	NA	ND
o&p-Xylenes	ND	ND	ND	NA	NA	ND
Pentane, 3-methyl	ND	ND	ND	NA	NA	ND
Pentanes, methyl	ND	ND	ND	NA	NA	ND
Propyl benzene	ND	ND	ND	NA	NA	ND
Xylenes	ND	ND	ND	NA	NA	ND
ACID EXTRACTABLES						
PRIORITY POLLUTANTS						
2-Chlorophenol	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	230	ND	ND	ND	ND	21.9
Pentachlorophenol	ND	ND	ND	ND	ND	ND
Phenol	210	ND	ND	708	360	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	ND
Totals	440	0	0	708	360	21.9
BASE/NEUTRAL EXTRACTABLES						
PRIORITY POLLUTANTS						
Acenaphthene	ND	ND	ND	ND	ND	2.3
Acenaphthylene	ND	ND	BMDL	ND	ND	ND
Anthracene	510	ND	BMDL	ND	ND	ND
Benzo(a)anthracene	ND	ND	BMDL	ND	ND	ND
Benzo(a)pyrene	1,100	ND	BMDL	ND	ND	ND
Benzo(b)fluoranthene	2,000	ND	733	ND	ND	ND
Benzo(ghi)perylene	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	95,100	44,600	12,200	206,000	114,000	ND
Butyl benzyl phthalate	1,200	ND	7,520	47,600	5,400	ND
Chrysene	ND	ND	BMDL	ND	ND	ND

TABLE 5 (CONTINUED)
SUMMARY OF AREA A CHEMICAL ANALYSIS RESULTS

Sample #	M1188	M1189	M1198	M1213	M1214	M1215
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	25-Apr	25-Apr	05-May	26-Apr	26-Apr	27-May
Depth	0-18"	0-18"	0-2'			
Composite/Discrete	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	X	X	W
BASE/NEUTRAL EXTRACTABLES, PRIORITY POLLUTANTS CONTINUED						
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND
Diethyl phthalate	ND	ND	ND	19,900	ND	ND
Dimethyl phthalate	ND	ND	ND	ND	ND	ND
Di-n-butyl phthalate	ND	ND	420	48,000	4,600	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND	ND
Di-n-octyl phthalate	ND	ND	ND	3,700	ND	ND
Fluoranthene	2,800	ND	BMDL	2,090	1,500	ND
Fluorene	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-c,d)pyrene	ND	ND	ND	ND	ND	ND
Isophorone	ND	ND	ND	ND	ND	ND
Naphthalene	2,000	ND	BMDL	860	4,200	ND
N-Nitrosodiphenylamine	ND	ND	3,210	1,570	ND	ND
Phenanthrene	2,200	ND	BMDL	3,500	3,100	ND
Pyrene	4,100	ND	BMDL	2,130	1,200	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	8.24
Totals	211,010	44,600	24,083	335,350	134,000	10.54
BASE/NEUTRAL/ACID EXTRACTABLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE)						
1H-Indene octahydro 2,2,4,4,7,7-hexamethyl	6,560	ND	ND	ND	ND	ND
1H-Benzo(b) fluorene	ND	ND	ND	ND	ND	ND
1H-Indene,2,3-dihydro	ND	ND	ND	ND	ND	ND
1H-Inden-5-ol,2,3-dihydro	ND	ND	ND	ND	ND	ND
1,1'-Biphenyl	ND	ND	ND	ND	ND	ND
1,2,3,4-Tetramethyl benzene	3,410	ND	ND	ND	ND	ND
1,2,3-Trimethyl benzene	ND	ND	ND	ND	ND	ND
1-Methyl anthracene	ND	ND	ND	ND	ND	ND
2,6-Dimethyl nonane	ND	ND	ND	ND	9,080	ND
2-Ethyl hexanoic	ND	ND	ND	4,234	ND	ND
2-Ethyl naphthalene	ND	ND	ND	ND	ND	ND
2-hydroxy benzaldehyde	ND	ND	ND	ND	ND	ND
2-methyl 1,1'-biphenyl	ND	ND	ND	ND	ND	ND
2-Methyl anthracenes	ND	ND	ND	ND	ND	ND
2-Methyl naphthalene	ND	ND	ND	ND	ND	ND
2-Methyl phenanthrene	ND	ND	ND	ND	ND	ND
2-methyl phenol	ND	ND	ND	ND	ND	ND
2-Propenoic acid, 2-Methyl, Dodecyl ester	ND	ND	ND	3,834	ND	ND

TABLE 5 (CONTINUED)
SUMMARY OF AREA A CHEMICAL ANALYSIS RESULTS

Sample #	M1188	M1189	M1198	M1213	M1214	M1215
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	25-Apr	25-Apr	05-May	26-Apr	26-Apr	27-May
Depth	0-18"	0-18"	0-2'			
Composite/Discrete	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	X	X	W
BASE/NEUTRAL/ACID EXTRACTIBLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED						
3-Ethyl-2-Methyl heptane	ND	ND	ND	ND	ND	ND
3-Methyl phenanthrene	ND	ND	ND	ND	ND	ND
3-Methyl phenol	ND	ND	ND	ND	ND	ND
4-Methyl phenanthrene	ND	ND	ND	ND	ND	ND
4-Methyl phenols	ND	ND	ND	ND	ND	ND
Alkanes	76,390	ND	2,668	20,114	54,924	ND
Benzenesulfonamide, 4-methyl	ND	ND	ND	ND	ND	ND
Bicyclo(3,2,1)oct-2-ene,3-methyl-4-methylene	ND	ND	ND	ND	ND	ND
Cyclohexane,pentyl	ND	ND	ND	ND	ND	ND
Diethyl benzene	ND	ND	ND	ND	ND	ND
Dimethyl 2-pentenes	ND	2,120	ND	ND	ND	ND
Dimethyl ethyl phenol	ND	ND	ND	ND	ND	ND
Dimethyl heptane	ND	ND	ND	ND	ND	ND
Dimethyl naphthalenes	ND	ND	ND	ND	ND	ND
Dimethyl pentenes	ND	ND	ND	ND	ND	ND
Dimethyl phenanthrenes	ND	ND	ND	ND	ND	ND
Dimethyl phenols	ND	ND	ND	ND	ND	ND
Dimethyl-ethyl benzenes	ND	ND	396	ND	ND	ND
Dimethyl-ethyl phenol	ND	ND	ND	ND	ND	ND
Ethanone, 1-(4-ethyl phenyl)-ethyl	ND	ND	ND	ND	ND	ND
Ethyl benzenes	ND	ND	ND	ND	ND	ND
Ethyl methyl benzene	ND	ND	ND	ND	ND	ND
Ethyl naphthalene	ND	ND	ND	ND	ND	ND
Ethyl phenols	ND	ND	ND	ND	ND	ND
Ethyl- methyl benzenes	ND	ND	ND	ND	ND	ND
Ethyl-1,2,3-trimethyl benzene	ND	ND	ND	ND	ND	ND
Ethyl-1,2,4-trimethyl benzene	8,920	ND	ND	ND	ND	ND
Ethyl-dimethyl benzenes	9,640	ND	ND	ND	ND	ND
Ethyl-methyl benzenes	4,840	ND	1,096	ND	ND	ND
Ethyl-methyl phenols	ND	ND	ND	ND	ND	ND
Ethyl-propyl benzene	ND	ND	ND	ND	ND	ND
Hexadecanoic acid	ND	ND	ND	ND	16,062	ND
Hexanal	ND	ND	ND	ND	11,010	ND
Hydroxy benzaldehyde	ND	ND	ND	4,628	ND	ND
Methoxy benzaldehyde	ND	ND	ND	ND	ND	ND
Methyl benzenes	ND	ND	721	3,939	9,400	ND
Methyl ethyl benzene	ND	ND	ND	ND	ND	ND
Methyl Fluorenes	ND	ND	ND	ND	ND	ND
Methyl naphthalene	ND	ND	387	ND	ND	ND
Methyl phenanthrene	ND	ND	ND	ND	ND	ND
Methyl phenols	ND	ND	ND	ND	ND	ND
Methyl-ethyl benzene	ND	ND	ND	ND	ND	ND

TABLE 5 (CONTINUED)
SUMMARY OF AREA A CHEMICAL ANALYSIS RESULTS

Sample #	M1188	M1189	M1198	M1213	M1214	M1215
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	25-Apr	25-Apr	05-May	26-Apr	26-Apr	27-May
Depth	0-18"	0-18"	0-2'			
Composite/Discrete	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	X	X	W
BASE/NEUTRAL/ACID EXTRACTIBLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED						
Methyl-ethyl phenols	ND	ND	ND	ND	ND	ND
Methyl-methyl ethyl phenols	ND	ND	ND	ND	ND	ND
Methyl-methyl-ethyl benzenes	7,290	ND	627	ND	ND	ND
Methyl-naphthalene	ND	ND	ND	ND	ND	ND
Methyl-propyl benzenes	ND	ND	ND	ND	ND	ND
Naphthalene, decahydro, trans	ND	ND	ND	ND	ND	ND
N-propyl benzamide	ND	ND	ND	8,490	ND	ND
Phosphoric acid, triphenyl ester	ND	ND	ND	ND	ND	ND
Propyl benzenes	ND	ND	ND	ND	ND	ND
Tetrachlorobiphenyls	ND	ND	ND	ND	ND	ND
Tetradecanoic acid	ND	ND	ND	1,229	ND	ND
Tetramethyl benzenes	ND	ND	ND	ND	ND	ND
Tetramethyl butyl phenols	5,090	2,480	335	ND	ND	ND
Trichloethene	ND	ND	ND	ND	ND	ND
Trimethyl benzenes	ND	ND	ND	ND	ND	ND
Trimethyl naphthalenes	4,950	ND	ND	ND	ND	ND
Trimethyl phenols	ND	ND	ND	ND	ND	ND
Xylenes	5,580	ND	386	ND	ND	ND
PCB						
PRIORITY POLLUTANTS						
Aroclor 1242	4,100 J1	ND	ND	ND	ND	ND
Aroclor 1254	15,000 J1	2,200 J1	3,600 J1	ND	ND	ND
Totals	19,100 J1	2,200 J1	3,600 J1	0	0	0
METALS						
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/L
PRIORITY POLLUTANTS						
Antimony	13.60	0.90	1.10	3.50	4.10	3.10
Arsenic	16.20	9.20	3.60	5.60	27.00	ND
Beryllium	2.30	0.09	ND	0.48	0.32	ND
Cadmium	11	24	ND	100	16	2.50
Chromium	99	170	ND	210	120	12.00
Copper	550	233	1.10	223	530	7.80
Lead	980	790	330	970	720	ND
Mercury	1.20	2.50	0.44	53	1.00	0.65
Nickel	84	54	ND	69	76	15
Selenium	ND	ND	0.42	ND	ND	ND

J1 = Estimated Concentration. Samples were reextracted past holding time limits as specified in 40CFR part 136

TABLE 5 (CONTINUED)
SUMMARY OF AREA A CHEMICAL ANALYSIS RESULTS

Sample #	M1188	M1189	M1196	M1213	M1214	M1215
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	25-Apr	25-Apr	05-May	26-Apr	26-Apr	27-May
Depth	0-18"	0-18"	0-2'			
Composite/Discrete	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	X	X	W
METALS, PRIORITY POLLUTANTS CONTINUED						
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/L
Silver	2.80	2.70	ND	2.90	1.50	2.00
Thallium	0.48	0.76	ND	0.39	0.16	ND
Zinc	2,470	718	2.20	1,340	2,970	71.00
Totals	4,221	2,005	339	2,978	4,466	114
PESTICIDES						
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L
PRIORITY POLLUTANTS						
Beta-BHC	ND	ND	ND	24 J1	ND	ND
4,4'-DDE	ND	ND	ND	140 J1	130 J1	ND
4,4'-DDD	ND	ND	ND	ND	160 J1	ND
Endosulfan sulfate	ND	ND	ND	160 J1	34 J1	ND
Endrin aldehyde	ND	ND	ND	65 J1	ND	ND
Totals	0	0	0	389 J1	324 J1	0
PHENOLICS & CYANIDE						
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L
Phenolics, Total	1.00	1.40	0.70			0.06
Cyanide, Total	1.40	1.20	1.00			<.025

J1 = Estimated concentration. Samples were reextracted past holding time limits as specified in 40CRF part 136

Sediment

Two buildings within area A were sampled for total priority pollutants plus 40 by taking sediment samples in 5 different locations of each building. The 5 sediment samples were then composited for analyses.

The composite samples from the drum reconditioning building and the boiler rooms (M1213 and M1214) also reflected high heavy metal concentrations that exceeded BISE cleanup levels for Cd, Cr, Cu, Pb, Hg and Zn. These parameters are the same metals found in the two soil samples near the 5,000 gallons settling tank and oil/water trench. Considering the high levels of heavy metals found in the soils it was not surprising to find equally high metal concentrations in the drum reconditioning building. The use of this building made it susceptible to concentration in the floor drain from the effluent produced in chemical cleaning of the drums. But the degree of contamination found in the boiler room was unexpected and indicated flagrant contamination of structures not used in operations that would be the obvious sources of contamination. One possible explanation may be that given the age of the facility (original buildings dating back to 1931 - See Section 2.4 and Figure 2), the use of buildings has changed to its present use from one that may have caused the contamination.

Regardless of sources, the heavy metals contamination is prevalent in both the soils and buildings at levels that exceed cleanup levels and indicates widespread contamination.

Sample M1213, from the floor drain of the Closed Head Reconditioning Building, had excessive concentrations of the same organic constituents found in soil sample M1188: phthalates, alkanes and lesser amounts of PAH's. Total priority pollutant base/neutral organics exceeded 300 mg/kg. The phthalates were much higher in the floor drain sample than in the soil of Area A, with bis (2-ethylhexyl)phthalate exceeding 200 mg/kg.

The presence of pesticides in both buildings is to be noted.

The Boiler Rooms (Sample M1214) had sediment samples taken off of their floors and walls. Though similar in constituency to the floor drain sample concentrations, total priority pollutant base/neutral organics made-up only 134 mg/kg, with phthalates being the primary constituent. Conversely, alkane concentration exceeded 54 mg/kg, as compared to 20 mg/kg for sample M1213. The pesticide concentrations were similar to those found in the floor-drain samples.

See Table 5 and Figure 4 for summary analytical results and location of excessive concentration levels, respectively.

Area B

Soils in Area B had a wide variety of contaminants from heavy metals and all organic groups, some of which exceeded the BISE cleanup levels. Area B covers the largest areal extent of the sampling program and receives runoff from the drum storage area and the tire pile, and overlays the storm sewer system. This makes it susceptible to various sources of contamination.

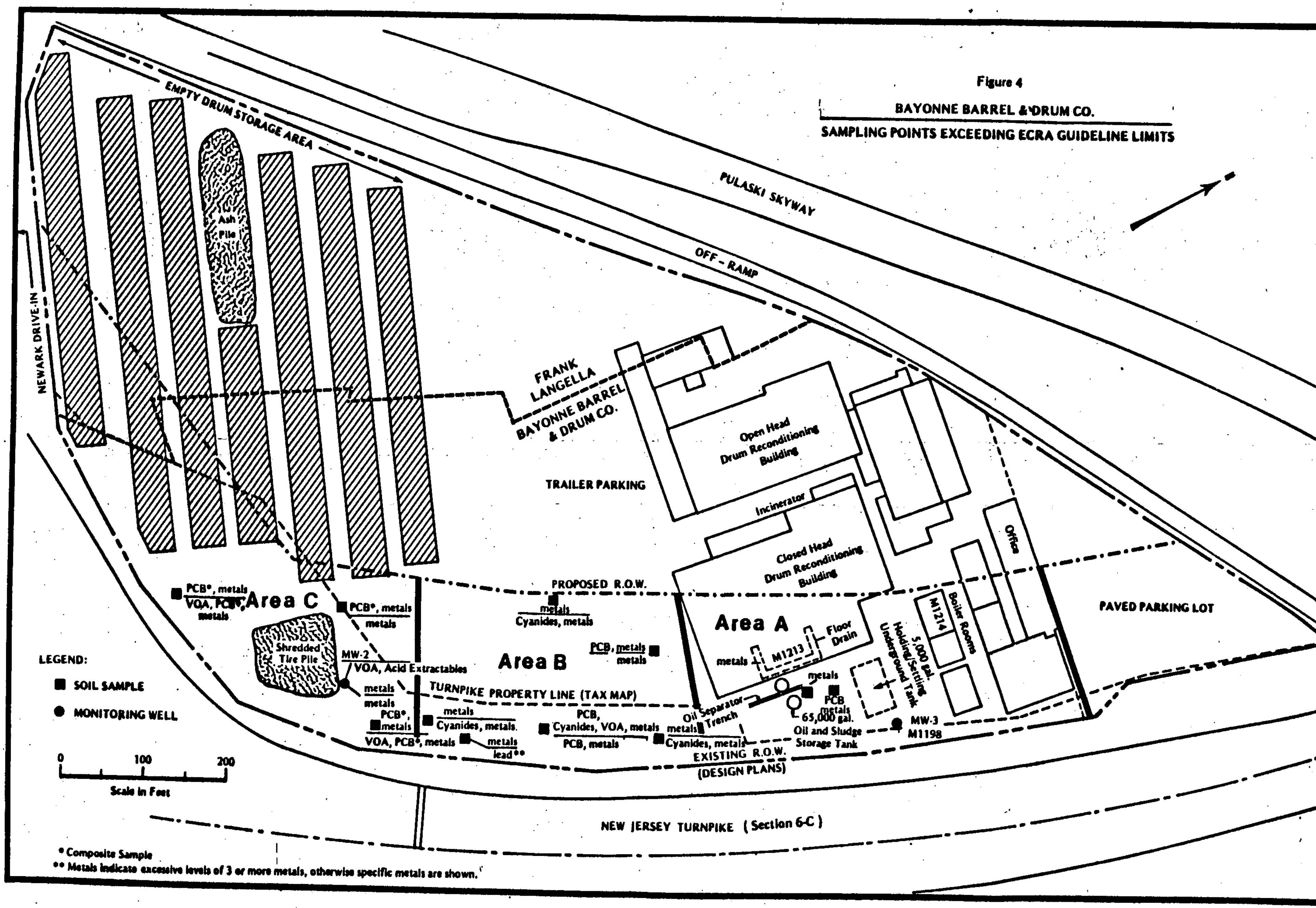


Figure 4
BAYONNE BARREL & DRUM CO.
SAMPLING POINTS EXCEEDING ECRA GUIDELINE LIMITS
PULASKI SKYWAY
OFF - RAMP
EMPTY DRUM STORAGE AREA
Ash Pile
NEWARK DRIVE-IN
FRANK LANGELLA
BAYONNE BARREL & DRUM CO.
TRAILER PARKING
Open Head Drum Reconditioning Building
Incinerator
Closed Head Drum Reconditioning Building
Office
Boiler Rooms
M1214
5,000 gal. Holding/Settling Underground Tank
PAVED PARKING LOT
PROPOSED R.O.W.
Area C
Area B
Area A
PCB*, metals
VOA, PCB*, metals
PCB*, metals
metals
metals
Cyanides, metals
PCB, metals
metals
Shredded Tire Pile
MW-2
VOA, Acid Extractables
metals
metals
TURNPIKE PROPERTY LINE (TAX MAP)
metals
M1213
Floor Drain
metals
PCB
metals
Oil Separator Trench
65,000 gal. Oil and Sludge Storage Tank
MW-3
M1198
PCB*, metals
metals
Cyanides, metals.
VOA, PCB*, metals
metals
lead**
PCB, Cyanides, VOA, metals
PCB, metals
metals
Cyanides, metals
EXISTING R.O.W.
(DESIGN PLANS)
NEW JERSEY TURNPIKE (Section 6-C)
LEGEND:
SOIL SAMPLE
MONITORING WELL
0
100
200
Scale in Feet
* Composite Sample
** Metals indicate excessive levels of 3 or more metals, otherwise specific metals are shown.

TABLE 6
SUMMARY OF AREA B CHEMICAL ANALYSIS RESULTS

Sample #	M1190	M1191	M1192	M1193	M1196	M1197	M1209	M1242
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Date of Submission	25-Apr	25-Apr	25-Apr	25-Apr	26-Apr	26-Apr	26-Apr	26-Apr
Depth	0-18"	18-36"	0-18"	18-36"	0-18"	18-36"	0-18"	
Composite/Discrete	D	D	D	D	D	D	C	C
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	S
VOLATILE ORGANICS								
PRIORITY POLLUTANTS								
Benzene	22,000	31,100	ND	1.6	BMDL	ND	NA	237
cis-1,3-Dichloropropylene	ND	ND	ND	ND	ND	ND	NA	ND
Ethylbenzene	243,000	408,000	5.83	ND	4.5	33.9	NA	ND
Methylene chloride	48,800 J3	91,600 J3	ND UJ3	ND UJ4	ND UJ5	ND UJ6	NA	ND
Tetrachloroethylene	ND	ND	ND	ND	ND	ND	NA	85.9
Toluene	265,000	321,000	ND	ND	ND	15.4	NA	ND
Totals	578,800	851,700	5.83	1.6	4.5	49.3	NA	322.9
ADDITIONAL PEAKS (SEMI-QUANTITATIVE)								
2-Methyl hexane	ND	ND	ND	ND	ND	ND	ND	ND
2-Pentanone, 4-Methyl	ND	ND	ND	ND	ND	ND	ND	ND
2-Propanones	ND	ND	8	30	6	32	ND	ND
3-methyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
3-Methyl pentane	9,000	ND	ND	ND	ND	ND	ND	ND
4-Ethyl 2-Pentanone	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl 2-Pentanones	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
Alkanes	ND	ND	ND	ND	ND	ND	ND	ND
Alkyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Benzene ethenyl-methyl	ND	ND	ND	ND	ND	57	ND	ND
Benzene, 1,2,3-trimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cycloheptane, methyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexanes, 1,1,3-trimethyl	ND	ND	87	20	ND	ND	ND	ND
Cyclohexane, 1,1-dimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane, 1,3-dimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexanes, 1,3-dimethyl, cis	ND	ND	10	ND	ND	ND	ND	ND
Cyclohexanes, 1,3-dimethyl, trans	ND	ND	9	ND	ND	ND	ND	ND
Cyclohexane, 1,1,3-trimethyl	ND	ND	ND	ND	ND	ND	ND	46
Cyclohexane, 1,2-dimethyl, cis	ND	ND	ND	ND	ND	ND	ND	37
Cyclohexane, 1,2-dimethyl, trans	ND	ND	ND	ND	ND	ND	ND	57
Cyclohexane, 1,3-dimethyl, trans	ND	ND	ND	ND	ND	ND	ND	26
Cyclohexane, 1,4-dimethyl, cis	ND	ND	ND	ND	ND	ND	ND	44
Cyclohexane, 1-ethyl-4-methyl cis	ND	ND	ND	ND	ND	ND	ND	22
Cyclohexane, 1-ethyl-4-methyl trans	ND	ND	ND	ND	ND	ND	ND	46
Cyclohexanone, 3,3,5-trimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclooctane, ethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclopentane, methyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclopentane, 1,3-dimethyl, trans	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl benzenes	ND	ND	ND	ND	ND	ND	ND	ND

J3 = Estimated concentrations due to greater than 25% difference between $\overline{RF}$ for initial calibration and RF for continuing calibration
ND = Not Detectable
BMDL = Below Minimum Detection Limits
UJ3 = Estimated quantitation limit 16.4ug/kg
UJ4 = Estimated quantitation limit 27.1ug/kg
UJ5 = Estimated quantitation limit 22.9ug/kg
UJ6 = Estimated quantitation limit 17.8ug/kg

TABLE 6 (CONTINUED)
SUMMARY OF AREA B CHEMICAL ANALYSIS RESULTS

Sample #	M1190	M1191	M1192	M1193	M1196	M1197	M1209	M1242
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Date of Submission	25-Apr	25-Apr	25-Apr	25-Apr	26-Apr	26-Apr	26-Apr	26-Apr
Depth	0-18"	18-36"	0-18"	18-36"	0-18"	18-36"	0-18"	
Composite/Discrete	D	D	D	D	D	D	C	C
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	S
VOLATILE ORGANICS ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED								
dimethyl cyclohexane	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl cyclopentane	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl-3-hexene	ND	ND	ND	ND	ND	ND	ND	ND
Ethane, 1,1'-oxybis	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl-methyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Heptane, methyl	ND	ND	ND	ND	ND	ND	ND	ND
Hydrocarbons	ND	74,000	ND	ND	ND	ND	ND	ND
Methyl cyclohexane	ND	ND	ND	ND	ND	ND	ND	ND
m-Xylenes	1,810,000	3,200,000	ND	ND	ND	ND	ND	ND
o&p-Xylenes	1,310,000	2,280,000	ND	ND	ND	ND	ND	ND
Pentane, 3-methyl	ND	ND	ND	ND	ND	ND	ND	ND
Pentanes, methyl	ND	ND	ND	ND	ND	ND	ND	15
Propyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	ND	ND	ND	ND	ND	ND	ND	ND
ACID EXTRACTABLES								
PRIORITY POLLUTANTS								
2-Chlorophenol	ND	880	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	470	3,700	ND	ND	ND	ND	ND	1780
2,4-Dimethylphenol	2,850	7,410	5,090	ND	ND	ND	890	2470
Pentachlorophenol	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	4,130	1,500	800	ND	BMDL	ND	ND	[illegible]000
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND
Totals	7,450	13,490	5,890	0	0	0	890	8,250
BASE/NEUTRAL EXTRACTABLES								
PRIORITY POLLUTANTS								
Acenaphthene	ND	15,500	ND	ND	ND	180	200	390
Acenaphthylene	ND	3,500	ND	ND	ND	ND	120	ND
Anthracene	4,700	14,600	ND	ND	150	240	230	ND
Benzo(a)anthracene	7,300	22,200	1,900	2,600	380	530	350	1,700
Benzo(a)pyrene	4,600	18,000	2,500	3,100	1,040	680	772	2,500
Benzo(b)fluoranthene	8,450	23,000	3,900	5,700	1,180	730	1,360	4,100
Benzo(ghi)perylene	2,100	4,000	2,600	2,700	1,150	ND	814	ND
bis(2-Ethylhexyl)phthalate	290,000	186,000	7,100	7,500	11,200	2,110	56,800	75,900
Butyl benzyl phthalate	30,100	4,100	ND	ND	1,310	310	1,170	9,030
Chrysene	7,910	24,400	2,200	2,700	690	600	ND	2,100

TABLE 6 (CONTINUED)
SUMMARY OF AREA B CHEMICAL ANALYSIS RESULTS

Sample #	M1190	M1191	M1192	M1193	M1196	M1197	M1209	M1242
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Date of Submission	25-Apr	25-Apr	25-Apr	25-Apr	28-Apr	28-Apr	28-Apr	28-Apr
Depth	0-18"	18-36"	0-18"	18-36"	0-18"	18-36"	0-18"	
Composite/Discrete	D	D	D	D	D	D	C	C
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	S
BASE/NEUTRAL EXTRACTABLES, PRIORITY POLLUTANTS CONTINUED								
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	11,800	ND	ND	ND	ND	ND	ND
Diethyl phthalate	7,550	ND	ND	ND	ND	ND	320	ND
Dimethyl phthalate	ND	ND	ND	ND	330	ND	ND	ND
Di-n-butyl phthalate	83,200	113,000 J	1,100 J	1,200 J	700	150	3,870	13,100
2,6-Dinitrotoluene	ND	ND	ND	ND	ND	1,900	ND	ND
Di-n-octyl phthalate	4,400	ND	ND	ND	310	ND	2,060	5,400
Fluoranthene	14,900	35,900	2,100	3,900	670	1,000	490	2,400
Fluorene	7,400	29,300	ND	ND	80	130	220	1,800
Indeno(1,2,3-c,d)pyrene	1,200	3,500	2,100	2,000	877	ND	560	ND
Isophorone	ND	ND	ND	ND	600	ND	ND	ND
Naphthalene	50,800	191,000	1,200	ND	680	390	5,630	31,000
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	26,200	80,800	ND	1,900	670	1,100	966	4,200
Pyrene	19,200	56,200	2,900	4,000	866	950	590	2,700
1,2,4-Trichlorobenzene	5,600	24,700	ND	ND	ND	ND	350	2,100
Totals	575,610	861,500	29,600	37,300	22,883	10,950	78,872	158,420
BASE/NEUTRAL/ACID EXTRACTIBLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED								
1H-Indene octahydro 2,2,4,4,7,7-hexamethyl	ND	ND	ND	ND	ND	ND	ND	ND
1H-Benzo(b) fluorene	ND	ND	ND	ND	ND	ND	ND	ND
1H-Indene,2,3-dihydro	ND	ND	ND	ND	ND	ND	ND	ND
1H-Inden-5-ol,2,3-dihydro	ND	ND	ND	ND	ND	ND	ND	ND
1,1'-Biphenyl	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4-Tetramethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trimethyl benzene	49,600	ND	ND	ND	ND	ND	ND	ND
1-Methyl anthracene	ND	ND	ND	ND	ND	ND	ND	ND
2,6-Dimethyl nonane	ND	ND	ND	ND	ND	ND	ND	ND
2-Ethyl hexanoic	ND	ND	ND	ND	ND	ND	ND	ND
2-Ethyl naphthalene	ND	ND	ND	ND	ND	ND	ND	26,501
2-hydroxy benzaldehyde	ND	ND	2,650	ND	ND	ND	ND	ND
2-methyl 1,1'-biphenyl	ND	ND	ND	ND	ND	ND	ND	ND
2-Methyl anthracenes	ND	ND	ND	ND	ND	ND	ND	ND
2-Methyl naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
2-Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
2-methyl phenol	ND	ND	9,770	ND	ND	ND	ND	ND
2-Propenoic acid, 2-Methyl, Dodecyl ester	ND	ND	ND	ND	ND	ND	ND	ND

J = Estimated concentration. QC Blank contaminated with 226ug/l of di-n-butyl phthalate

TABLE 6 (CONTINUED)
SUMMARY OF AREA B CHEMICAL ANALYSIS RESULTS

Sample #	M1190	M1191	M1192	M1193	M1196	M1197	M1209	M1242
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Date of Submission	25-Apr	25-Apr	25-Apr	25-Apr	26-Apr	26-Apr	26-Apr	26-Apr
Depth	0-18"	18-36"	0-18"	18-36"	0-18"	18-36"	0-18"	
Composite/Discrete	D	D	D	D	D	D	C	C
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	S
BASE/NEUTRAL/ACID EXTRACTIBLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED								
3-Ethyl-2-Methyl heptane	ND	21,100	ND	ND	ND	ND	ND	ND
3-Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
3-Methyl phenol	ND	ND	ND	ND	ND	ND	ND	8,676
4-Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl phenols	ND	ND	73,500	ND	ND	ND	ND	10,771
Alkanes	196,600	243,500	17,170	ND	ND	2,241	13,350	123,250
Benzenesulfonamide, 4-methyl	ND	ND	ND	ND	378	ND	ND	ND
Bicyclo(3,2,1)oct-2-ene,3-methyl-4-methylene	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane,pentyl	ND	ND	ND	ND	ND	ND	ND	ND
Diethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl 2-pentenes	ND	ND	7,250	ND	ND	ND	ND	ND
Dimethyl ethyl phenol	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl heptane	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl pentenes	ND	ND	ND	ND	ND	514	ND	ND
Dimethyl phenanthrenes	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl-ethyl benzenes	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl-ethyl phenol	ND	ND	ND	ND	ND	ND	ND	58,969
Ethanone, 1-(4-ethyl phenyl)-ethyl	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl benzenes	91,300	67,700	ND	ND	564	ND	ND	53,189
Ethyl methyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl- methyl benzenes	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl-1,2,3-trimethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl-1,2,4-trimethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl-dimethyl benzenes	96,300	ND	ND	ND	773	ND	31,040	114,556
Ethyl-methyl benzenes	388,900	129,900	7,870	ND	404	875	ND	275,877
Ethyl-methyl phenols	ND	ND	ND	ND	ND	ND	ND	0
Ethyl-propyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Hexadecanoic acid	ND	ND	ND	ND	ND	ND	ND	ND
Hexanal	ND	ND	ND	ND	ND	ND	ND	ND
Hydroxy benzaldehyde	ND	ND	ND	ND	ND	ND	ND	ND
Methoxy benzaldehyde	ND	ND	19,600	ND	ND	ND	ND	ND
Methyl benzenes	113,000	47,400	ND	ND	3,227	2,620	ND	63,345
Methyl ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Fluorenes	ND	ND	ND	ND	ND	ND	ND	ND
Methyl naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
Methyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-ethyl benzene	ND	45,700	ND	ND	ND	ND	ND	ND

TABLE 6 (CONTINUED)
SUMMARY OF AREA 1 CHEMICAL ANALYSIS RESULTS

Sample #	M1190	M1191	M1192	M1193	M1194	M1197	M1209	M1242
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Date of Submission	25-Apr	25-Apr	25-Apr	25-Apr	26-Apr	26-Apr	26-Apr	26-Apr
Depth	0-18"	18-36"	0-18"	18-36"	0-18"	18-36"	0-18"	
Composite/Discrete	D	D	D	D	D	D	C	C
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	S
BASE/NEUTRAL/ACID EXTRACTIBLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED								
Methyl-ethyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-methyl ethyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-methyl-ethyl benzenes	ND	48,400	ND	3,180	ND	ND	ND	ND
Methyl-naphthalene	ND	26,300	ND	ND	ND	ND	ND	ND
Methyl-propyl benzenes	81,900	26,300	ND	ND	ND	ND	4,925	ND
Naphthalene,decahydro,trans	ND	ND	ND	ND	ND	ND	ND	ND
N-propyl benzamide	ND	ND	ND	ND	ND	ND	ND	ND
Phosphoric acid, triphenyl ester	ND	ND	ND	ND	ND	ND	ND	ND
Propyl benzenes	27,600	17,700	ND	ND	ND	ND	ND	ND
Tetrachlorobiphenyls	ND	ND	ND	ND	ND	ND	ND	ND
Tetradecanoic acid	ND	ND	ND	ND	ND	ND	ND	ND
Tetramethyl benzenes	112,200	ND	ND	ND	1,182	ND	5,042	25,960
Tetramethyl butyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Trichlonethene	ND	ND	ND	ND	ND	ND	ND	ND
Trimethyl benzenes	ND	82,100	ND	ND	894	ND	ND	ND
Trimethyl naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
Trimethyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	475,000	238,700	3,600	ND	1,868	759	ND	232,560
PCB								
PRIORITY POLLUTANTS								
Aroclor 1242	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1254	[illegible]7,000 J1	73,000 J1	57,000 J1	1,400 J1	1,800 J1	140 J1	2,800 J1	1,100 J1
Totals	[illegible]7,000 J1	73,000 J1	87,000 J1	1,400 J1	1,800 J1	140 J1	2,800 J1	1,100 J1
METALS UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PRIORITY POLLUTANTS								
Antimony	12.00	16.00	1.70	3.20	1.00	1.20	6.70	12.00
Arsenic	38.00	73.00	24.00	26.00	5.60	1.50	18.00	62.00
Beryllium	1.20	0.18	0.52	0.59	0.38	0.34	0.25	9.70
Cadmium	63	71	6	10	7.90	0.35	27	29
Chromium	790	590	67	96	130	10.00	305	510
Copper	1,580	870	380	430	140	34	1,150	2,050
Lead	8,200	8,520	1,440	ND	1,010	1,060	2,500	5,600
Mercury	9.10	1.90	1.60	1.80	1.90	0.27	1.20	3.60
Nickel	160	110	37	5.40	24.00	6.50	110	218
Selenium	ND	ND	ND	ND	ND	ND	ND	ND

J1 = Estimated Concentration. Samples were reextracted past holding time limits as specified in 40CFR part 136

TABLE 6 (CONTINUED)
SUMMARY OF AREA B CHEMICAL ANALYSIS RESULTS

Sample #	M1190	M1191	M1192	M1193	M1196	M1197	M1209	M1242
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Date of Submission	25-Apr	25-Apr	25-Apr	25-Apr	28-Apr	28-Apr	28-Apr	28-Apr
Depth	0-18"	18-36"	0-18"	18-36"	0-18"	18-36"	0-18"	
Composite/Discrete	D	D	D	D	D	D	C	C
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	S
METALS, PRIORITY POLLUTANTS CONTINUED								
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Silver	2.80	2.70	6.40	4.20	0.69	0.22	6.40	4.40
Thallium	ND	ND	0.14	ND	0.29	0.23	0.43	ND
Zinc	6,120	4,970	1,050	1,400	640	130	2,760	12,200
Totals	16,976	15,227	3,014	1,979	1,962	1,247	6,885	20,699
PESTICIDES								
PRIORITY POLLUTANTS								
Beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND	ND	ND	ND	ND
Totals	0	0	0	0	0	0	0	0
PHENOLICS & CYANIDE								
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Phenolics, Total	13.00	0.24	0.25	0.13	0.38	0.07	1.90	5.90
Cyanide, Total	16.00	13.00	1.70	2.30	2.20	1.00	0.73	16.00

Samples M1190 and M1191 were the only samples in Area B to have excessive levels of contamination from volatile organics (see Table 6 and Figure 4). M1190 (0-18") and M1191 (18-36") both exceeded the clean-up levels of mg/kg total volatile organics (VOA) used by the BISE, with total priority pollutant concentrations of 579 mg/kg and 852 mg/kg, respectively. There are also high concentrations of the non-priority pollutant VOA xylene (in all its isomeric forms) in samples M1190 and M1191. It is not surprising that the deeper sample had higher VOA concentrations as samples closer to the surface volatilize more easily. No other samples in Area B had concentrations of VOAs exceeding 1 mg/kg.

Samples M1190 and M1191 are also the only samples in Area B to exceed the cleanup level criteria for total cyanides (12 mg/kg) with concentrations of 16 mg/kg and 13 mg/kg, respectively.

There was no consistency in the results with respect to depth, as some organic parameters were higher in the 0-18" interval than in the 18-36" interval, while others were higher in the lower depth interval than in the surface interval. For example, in samples M1190 and M1191, most of the priority pollutant base/neutral organic parameters were higher in M1191 than in M1190, while for alkanes (a nonpriority pollutant), xylenes and other non-priority pollutant base/neutrals, the reverse was true. The same is true for M1192, M1193 and M1196/M1197 (which is upgradient of the M1190/M1191), but with lower concentrations.

The alkane concentrations in the borings of samples M1192/M1193 and M1196/M1197 were likewise inconsistent, but to a greater degree. For M1192 (0-18") the alkane concentration was 17.2 mg/kg while from 18"-36" (M1193) there was no detectable concentration. The opposite is true for samples M1196 and M1197: M1196 had no detectable levels of alkane while M1197 had 2.2 mg/kg. Samples M1190/M1191, the boring for which is only 75 feet south of that for M1196/M1197, had high concentrations in both intervals.

PCB's also greatly exceeded cleanup levels of 1-5 mg/kg in samples M1190, M1191 and M1192 with concentrations of 87 mg/kg, 73 mg/kg and 37 mg/kg, respectively. Samples M1190 and M1191 also exceed USEPA trigger levels of 50 mg/kg.

Heavy metal concentrations that exceeded BISE cleanup levels were detected in all soil samples in Area B. The metals were the same as those found in Area A but with the addition of Arsenic (As), nickel (Ni), and silver (Ag). The highest levels were found in samples M1190/M1191 with Pb (8,200/8,520 mg/kg), Cr (790/590 mg/kg), Cd (63/71 mg/kg), Hg (9.1/1.9 mg/kg), Zn (6,120 /4,970 mg/kg), and Cu (1,580/870 mg/kg) well above other discrete soil samples concentrations. Only composite sample M1242 (18-36") had higher levels of Cu and Zn.

The extensive metal contamination found throughout Area B is most likely from leaching of the ash pile and runoff from the drum storage area. Area B is in closer proximity to both these sources than Area A thereby resulting in higher contaminant levels.

TABLE 7

SUMMARY OF AREA C CHEMICAL ANALYSIS RESULTS

Sample #	M1194	M1195	M1203	M1205	M1206	M1207	M1208	M1217
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	26-Apr	26-Apr	06-May	06-May	06-May	26-Apr	26-Apr	27-May
Depth	0-18"	18-36"	3-5'	13-15'	17.5-19	0-18"	18-36"	
Composite/Discrete	D	D	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	W
VOLATILE ORGANICS								
PRIORITY POLLUTANTS								
Benzene	ND	ND	85.3	5.6	ND	4.53	1,100	5.58
cis-1,3-Dichloropropylene	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	333	46	111	19.9	44,300	15.9
Methylene chloride	ND UJ7	ND UJ8	34	ND	44	46.9 J2	5,280 J3	ND UJ9
Tetrachloroethylene	ND	ND	6.8	ND	ND	ND	ND	ND
Toluene	2.1	ND	318	58	85	25.2	218,000	76.6
Totals	2.1	0	777.1	109.6	240	96.53	268,680	98.08
VOLATILE ORGANICS, ADDITIONAL PEAKS (SEMI-QUANTITATIVE)								
2-Methyl hexane	ND	ND	295	ND	ND	ND	ND	ND
2-Pentanone, 4-Methyl	ND	ND	ND	ND	ND	ND	ND	323
2-Propanones	ND	ND	ND	71	ND	1,050	ND	64
3-methyl benzene	ND	ND	ND	ND	ND	ND	62,000	ND
3-Methyl pentane	ND	ND	ND	ND	ND	ND	ND	ND
4-Ethyl 2-Pentanone	ND	ND	572	ND	ND	ND	ND	ND
4-Methyl 2-Pentanones	ND	ND	ND	1,023	240	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
Alkanes	ND	ND	409	ND	ND	ND	ND	ND
Alkyl benzene	ND	ND	ND	ND	ND	ND	42,000	ND
Benzene ethenyl-methyl	ND	ND	ND	ND	ND	ND	ND	ND
Benzene, 1,2,3-trimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cycloheptane, methyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexanes, 1,1,3-trimethyl	ND	ND	ND	ND	ND	160	ND	ND
Cyclohexane, 1,1-dimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane, 1,3-dimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexanes, 1,3-dimethyl, cis	ND	ND	ND	ND	ND	94	ND	ND
Cyclohexanes, 1,3-dimethyl,trans	ND	ND	ND	ND	ND	53	ND	ND
Cyclohexane,1,1,3-trimethyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane,1,2-dimethyl,cis	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane,1,2-dimethyl,trans	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane,1,3-dimethyl,trans	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane,1,4-dimethyl,cis	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane,1-ethyl-4-methyl cis	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane,1-ethyl-4-methyl trans	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexanone, 3,3,5-trimethyl	ND	ND	ND	ND	ND	ND	ND	39
Cyclooctane, butyl	ND	ND	ND	ND	ND	ND	ND	ND
Cyclopentane, methyl	ND	ND	ND	ND	ND	994	ND	ND
Cyclopentane,1,3-dimethyl,trans	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl benzenes	ND	ND	ND	ND	ND	847	ND	ND

J2 = Estimated concentration due to %RSD for response factor in initial calibration higher than 30%

J3 = Estimated concentration due to greater than 25% difference between $\overline{RF}$ for initial calibration and RF for continuing calibration

ND = Not Detectable

BMDL = Below Minimum Detection Limits

UJ7 = Estimated quantitation limit 16.4ug/kg

UJ8 = Estimated quantitation limit 16.9ug/kg

UJ9 = Estimated quantitation limit 11.0ug/l

TABLE 7 (CONTINUED)
SUMMARY OF AREA C CHEMICAL ANALYSIS RESULTS

Sample #	M1194	M1195	M1203	M1205	M1206	M1207	M1208	M1217
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	28-Apr	28-Apr	06-May	06-May	06-May	26-Apr	26-Apr	27-May
Depth	0-18"	18-36"	3-5'	13-15'	17.5-19	0-18"	18-36"	
Composite/Discrete	D	D	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	W
VOLATILE ORGANICS ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED								
dimethyl cyclohexane	ND	ND	179	ND	ND	ND	ND	ND
Dimethyl cyclopentane	ND	ND	218	ND	ND	ND	ND	ND
Dimethyl-3-hexene	ND	ND	412	ND	ND	ND	ND	ND
Ethane, 1,1'-oxybis	ND	ND	ND	ND	ND	ND	ND	13
Ethyl-methyl benzene	ND	ND	ND	ND	ND	ND	ND	21
Heptane, methyl	ND	ND	ND	ND	ND	115	ND	ND
Hydrocarbons	ND	ND	ND	ND	ND	ND	13,000	ND
Methyl cyclohexane	ND	ND	2,078	ND	ND	ND	ND	ND
m-Xylenes	ND	ND	ND	ND	ND	ND	1,010,000	ND
o&p-Xylenes	ND	ND	ND	ND	ND	ND	769,000	ND
Pentane, 3-methyl	ND	ND	ND	ND	ND	ND	ND	ND
Pentanes, methyl	ND	ND	ND	ND	ND	9,550	ND	ND
Propyl benzene	ND	ND	ND	ND	ND	ND	187,000	ND
Xylenes	ND	ND	7,105	91	1,535	ND	ND	326
ACID EXTRACTABLES								
PRIORITY POLLUTANTS								
2-Chlorophenol	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	188,000	79,900	11,500	ND	3,600	860
Pentachlorophenol	ND	ND	ND	ND	ND	ND	1,000	ND
Phenol	ND	ND	27,700	58,900	750	ND	17,600	877
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	ND	650	ND
Totals	0	0	215,700	138,800	12,250	0	22,850	1,737
BASE/NEUTRAL EXTRACTABLES								
PRIORITY POLLUTANTS								
Acenaphthene	ND	ND	BMDL	19,600	ND	ND	ND	9.2
Acenaphthylene	ND	ND	ND	ND	ND	250	ND	ND
Anthracene	ND	ND	BMDL	15,300	310	140	ND	ND
Benzo(a)anthracene	ND	ND	BMDL	16,800	300	500	ND	ND
Benzo(a)pyrene	ND	ND	10,100	11,000	510	994	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	1,200	ND	ND
Benzo(ghi)perylene	ND	ND	BMDL	BMDL	350	895	ND	ND
bis(2-Ethylhexyl)phthalate	4,100	1,700	61,700	ND	1,500	4,620	411,000	ND
Butyl benzyl phthalate	ND	ND	BMDL	ND	ND	110	26,500	ND
Chrysene	ND	ND	BMDL	ND	330	670	ND	ND

TABLE 7 (CONTINUED)
SUMMARY OF AREA C CHEMICAL ANALYSIS RESULTS

Sample #	M1194	M1195	M1203	M1205	M1206	M1207	M1208	M1217
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	28-Apr	28-Apr	06-May	06-May	06-May	28-Apr	28-Apr	27-May
Depth	0-18"	18-36"	3-5'	13-15'	17.5-19	0-18"	18-36"	
Composite/Discrete	D	D	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	W
BASE/NEUTRAL EXTRACTABLES, PRIORITY POLLUTANTS CONTINUED								
Dibenzo(a,h)anthracene	ND	ND	ND	BMDL	ND	140	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
Diethyl phthalate	ND	ND	ND	ND	ND	ND	11,500	ND
Dimethyl phthalate	ND	ND	ND	ND	ND	ND	22,000	ND
Di-n-butyl phthalate	ND	ND	11,300	45,300	480	96	87,900	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-octyl phthalate	ND	ND	ND	ND	ND	ND	15,700	ND
Fluoranthene	ND	ND	12,200	32,000	630	460	3,400	ND
Fluorene	ND	ND	BMDL	19,300	360	ND	2,800	3.15
Indeno(1,2,3-c,d)pyrene	ND	ND	BMDL	BMDL	280	640	ND	ND
Isophorone	ND	ND	ND	ND	ND	260	ND	ND
Naphthalene	ND	ND	44,700	13,700	1,660	240	179,000	16.3
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	18,900	48,400	1,150	430	8,180	4.9
Pyrene	ND	ND	11,700	25,300	530	894	4,700	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	6,200	ND
Totals	4,100	1,700	170,600	246,700	8,390	12,539	778,880	34
BASE/NEUTRAL/ACID EXTRACTABLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE)								
1H-Indene octahydro 2,2,4,4,7,7-hexamethyl	ND	ND	ND	ND	ND	ND	ND	ND
1H-Benzo(b) fluorene	ND	ND	ND	ND	ND	ND	ND	ND
1H-Indene,2,3-dihydro	ND	ND	ND	ND	ND	ND	2,250	ND
1H-Inden-5-ol,2,3-dihydro	ND	ND	19,700	ND	ND	ND	ND	ND
1,1'-Biphenyl	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4-Tetramethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trimethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
1-Methyl anthracene	ND	ND	ND	ND	ND	ND	ND	ND
2,6-Dimethyl nonane	ND	ND	ND	ND	ND	ND	ND	ND
2-Ethyl hexanoic	ND	ND	ND	ND	ND	ND	ND	ND
2-Ethyl naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
2-hydroxy benzaldehyde	ND	ND	ND	ND	ND	ND	ND	ND
2-methyl 1,1'-biphenyl	ND	ND	ND	ND	ND	ND	ND	ND
2-Methyl anthracenes	ND	ND	ND	ND	ND	ND	ND	ND
2-Methyl naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
2-Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
2-methyl phenol	ND	ND	ND	ND	ND	ND	ND	ND
2-Propenoic acid, 2-Methyl, Dodecyl ester	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 7 (CONTINUED)
SUMMARY OF AREA C CHEMICAL ANALYSIS RESULTS

Sample #	M1194	M1195	M1203	M1205	M1206	M1207	M1208	M1217
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	28-Apr	28-Apr	06-May	06-May	06-May	28-Apr	28-Apr	27-May
Depth	0-18"	18-36"	3-5'	13-15'	17.5-19	0-18"	18-36"	
Composite/Discrete	D	D	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	W
BASE/NEUTRAL/ACID EXTRACTIBLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED								
3-Ethyl-2-Methyl heptane	ND	ND	ND	ND	ND	ND	ND	ND
3-Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
3-Methyl phenol	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Alkanes	2,870	ND	53,000	ND	937	ND	2,790	ND
Benzenesulfonamide, 4-methyl	ND	ND	ND	ND	ND	ND	ND	ND
Bicyclo(3,2,1)oct-2-ene,3-methyl-4-methylene	ND	ND	ND	ND	ND	ND	2,870	ND
Cyclohexane,pentyl	ND	ND	ND	ND	ND	ND	ND	ND
Diethyl benzene	ND	ND	ND	ND	ND	ND	2,560	ND
Dimethyl 2-pentenes	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl ethyl phenol	ND	ND	ND	1,400	ND	ND	ND	ND
Dimethyl heptane	1,830	ND	ND	ND	ND	ND	ND	ND
Dimethyl naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl pentenes	ND	165,770	ND	ND	ND	ND	ND	ND
Dimethyl phenanthrenes	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phenols	ND	ND	6,860	1,090	6,019	ND	ND	ND
Dimethyl-ethyl benzenes	ND	ND	29,000	ND	ND	ND	ND	ND
Dimethyl-ethyl phenol	ND	ND	ND	ND	ND	ND	ND	ND
Ethanone, 1-(4-ethyl phenyl)-ethyl	ND	ND	ND	21,210	ND	ND	ND	ND
Ethyl benzenes	ND	ND	ND	ND	ND	270	2,450	ND
Ethyl methyl benzene	ND	ND	ND	ND	ND	ND	16,730	ND
Ethyl naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl phenols	ND	ND	6,890	11,410	ND	ND	ND	ND
Ethyl- methyl benzenes	ND	ND	ND	ND	ND	ND	10,770	ND
Ethyl-1,2,3-trimethyl benzene	ND	ND	ND	ND	ND	ND	1,980	ND
Ethyl-1,2,4-trimethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl-dimethyl benzenes	ND	ND	ND	ND	ND	ND	16,100	ND
Ethyl-methyl benzenes	ND	ND	299,300	ND	3,290	315	ND	ND
Ethyl-methyl phenols	ND	ND	17,880	16,280	4,210	ND	ND	ND
Ethyl-propyl benzene	ND	ND	35,100	ND	ND	ND	ND	ND
Hexadecanoic acid	ND	ND	ND	ND	ND	ND	ND	ND
Hexanal	ND	ND	ND	ND	ND	ND	ND	ND
Hydroxy benzaldehyde	ND	ND	ND	ND	ND	ND	ND	ND
Methoxy benzaldehyde	ND	ND	ND	ND	ND	ND	ND	ND
Methyl benzenes	13,280	11,920	ND	ND	ND	1,585	7,780	ND
Methyl ethyl benzene	ND	ND	ND	ND	ND	ND	1,375	ND
Methyl Fluorenes	ND	ND	ND	ND	ND	ND	ND	ND
Methyl naphthalene	ND	ND	ND	ND	1,190	ND	ND	ND
Methyl phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
Methyl phenols	ND	ND	13,100	26,070	9,870	ND	ND	ND
Methyl-ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 7 (CONTINUED)
SUMMARY OF AREA C CHEMICAL ANALYSIS RESULTS

Sample #	M1194	M1195	M1203	M1205	M1206	M1207	M1208	M1217
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	28-Apr	28-Apr	06-May	06-May	06-May	28-Apr	25-Apr	27-May
Depth	0-18"	18-36"	3-5'	13-15'	17.5-19	0-18"	18-36"	
Composite/Discrete	D	D	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	W
BASE/NEUTRAL/ACID EXTRACTIBLES, ADDITIONAL PEAKS (SEMI-QUANTITATIVE) CONTINUED								
Methyl-ethyl phenols	ND	ND	2,080	ND	918	ND	ND	ND
Methyl-methyl ethyl phenols	ND	ND	ND	3,920	ND	ND	ND	ND
Methyl-methyl-ethyl benzenes	ND	ND	ND	ND	896	ND	1,750	ND
Methyl-naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-propyl benzenes	ND	ND	ND	ND	ND	ND	4,805	ND
Naphthalene,decahydro,trans	ND	ND	ND	ND	ND	ND	ND	ND
N-propyl benzamide	ND	ND	ND	ND	ND	ND	ND	ND
Phosphoric acid, triphenyl ester	ND	ND	ND	2,890	ND	ND	ND	ND
Propyl benzenes	ND	ND	ND	ND	ND	ND	4,700	ND
Tetrachlorobiphenyls	ND	ND	ND	ND	ND	927	ND	ND
Tetradecanoic acid	ND	ND	ND	ND	ND	ND	ND	ND
Tetramethyl benzenes	ND	ND	57,700	ND	ND	ND	4,350	ND
Tetramethyl butyl phenols	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	1,530	ND	ND	ND	ND	ND	ND
Trimethyl benzenes	ND	ND	ND	ND	ND	491	20,410	ND
Trimethyl naphthalenes	ND	ND	ND	ND	ND	ND	ND	ND
Trimethyl phenols	ND	ND	2,590	2,900	2,490	ND	ND	ND
Xylenes	ND	ND	98,900	9,370	1,050	740	26,000	ND
PCB								
PRIORITY POLLUTANTS								
Aroclor 1242	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1254	500 J1	79 J1	ND	ND	1,100 J1	5,300 J1	50,000 J1	ND
Totals	500 J1	79 J1	0	0	1,100 J1	5,300 J1	50,000 J1	0
METALS								
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/L
PRIORITY POLLUTANTS								
Antimony	0.90	0.20	19.00	ND	ND	5.20	6.70	2.60
Arsenic	4.50	3.70	11.00	5.90	1.30	14.00	7.70	2.00
Beryllium	0.16	0.14	ND	ND	ND	0.32	0.49	ND
Cadmium	0.49	ND	0.28	ND	ND	9.90	12	ND
Chromium	19	9.90	3.30	1.10	ND	130	280	2.30
Copper	29	23	4.80	1.60	ND	250	350	8.30
Lead	43	43	2,760	350	90	1,060	1,980	ND
Mercury	0.39	0.10	1.30	1.90	0.05	2.00	1.30	ND
Nickel	7.40	5.20	ND	0.30	ND	35	57	22
Selenium	ND	ND	3.90	0.32	ND	0.60	1.00	ND

J1 = Estimated Concentration. Samples were reextracted past holding time limits as specified in [illegible]

TABLE 7
SUMMARY OF AREA C CHEMICAL ANALYSIS RESULTS

Sample #	M1194	M1195	M1203	M1205	M1206	M1207	M1208	M1217
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l
Date of Submission	28-Apr	28-Apr	06-May	06-May	06-May	28-Apr	28-Apr	27-May
Depth	0-18"	18-36"	3-5'	13-15'	17.5-19	0-18"	18-36"	
Composite/Discrete	D	D	D	D	D	C	C	D
Soil (S)/Water (W)/Sediment (X)	S	S	S	S	S	S	S	W

METALS, PRIORITY POLLUTANTS CONTINUED								
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/L
Silver	0.18	0.11	ND	ND	ND	1.10	0.99	ND
Thallium	0.43	2.30	ND	ND	ND	0.33	0.33	ND
Zinc	67	49	18.00	3.70	ND	705	2,200	69.00
Totals	172	137	2,822	365	91	2,213	4,898	106

PESTICIDES — PRIORITY POLLUTANTS								
Beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND	ND	ND	ND	ND
Totals	0	0	0	0	0	0	0	0

PHENOLICS & CYANIDE								
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L
Phenolics, Total	0.11	0.12	0.40	1700	0.30	0.62	0.47	16.30
Cyanide, Total	1.80	0.69	0.90	0.50	<.05	2.60	8.80	0.08

The randomness of these results indicates that the current site operations might not be the major source of contamination. Previous land-use (see Section 2.4) activities may have been caused by subsurface contamination that was then covered with fill of questionable cleanliness. This makes it impossible to discern target-to-source relationships or to infer that contamination is defined by the existing boundaries of Bayonne Barrel and Drum.

Area C

The soil samples in Area C, as in Areas A and B, had concentrations that exceed the BISE cleanup criteria for volatile organic, heavy metals and PCBs, plus high levels of acid extractable organics, phenolics, and a variety of base/neutral organics. See Table 7 and Figure 4 for the results of the analyses.

Composite sample M1208 (18-36") had the highest level of VOAs with a total concentration of 2,351.7 mg/kg, whereas M1207 (0-18") had less than 12 mg/kg. These results include the non-priority pollutant VOAs.

The three soil samples from monitoring well #2 (M1203, M1205 and M1206) also had total VOAs exceeding the 1 mg/kg cleanup level. The 3-5' sample (M1203) had 11 mg/kg, while the samples from 13-15' and 17.5-19' had VOA total concentrations of only 1-2 mg/kg. All three samples from well #2 also had high acid extractable organic concentrations that decreased with depth. The two main parameters were 2, 4-dimethylphenol and phenol, while total phenolics in sample 1205 (13-15') measured at 1,700 mg/kg.

Heavy metal concentrations in the first two soil samples from monitoring well #2 exceeded BISE cleanup levels for lead and mercury. The lead concentration was significantly less for the 13 to 15 foot sample (M1205) than for the 3 to 5 foot layer (M1203) and both lead and mercury totally absent from the 17.5 to 19 foot sample (M1206). The mercury concentrations were not significantly different from sample M1203 (1.3 mg/kg) to sample M1205 (1.9 mg/kg).

The composite soil samples (M1207/M1208) had excessive levels of cadmium, chromium, copper, mercury, lead and zinc. Lead concentrations ranged from 10 to 20 times the cleanup level of 100 mg/kg. In contast to the monitoring well soil samples the composite samples had higher metal concentrations in the lower sample interval (18-36 inches) than for the surface soil sample (0-18 inches). Though both composite samples are above the uppermost monitoring well soil sample. Since compositing does not allow for relating a specific sample to a contaminant source it can be safely proposed that like the rest of the site, metal contamination is from leaching of the ash pile and runoff from the drum storage area.

The metal contamination does not appear to have migrated below the water table to any great extent but not enough evidence is available to discern a concentration decrease with depth relationship. As groundwater on the site did not possess excessive levels of metals it can be inferred that the metals are tightly bound to the sediment under existing pH and redox (reduction/oxidation) conditions.

Base/neutral organic concentrations were equally as high as elsewhere in the study area, but with some differences. The phthalates especially bis(2-ethyhexyl)phthalate, were greater than 6 mg/kg in sample M1203 (3'-5'), not detectable in sample M1205 (13'-15'), but at 17.5'-19 their concentration rose to 1.5 mg/kg. Also for the composite samples M1207/M1208, the upper composite (0-18") has a bis(2ethylhexyl) phthalate concentration of 4.6 mg/kg and a lower composite (18-36") concentration of 411 mg/kg.

Discrete samples M1194/M1195 were conspicuously void of high concentrations of contaminants found in the other Area C samples. Except possibly for the base/ neutral organic, methyl benzene, there were no other contaminant levels of concern even heavy metals. Samples M1194/M1195 were obtained farther south than any other discrete samples, and are upgradient from both the ash and tire piles and the runoff from the drum storage area.

PCBs exceeded clean-up levels for both the upper and lower depth intervals of composite samples M1207/M1208, with the lower sample being almost ten times higher in concentration than the upper (50 mg/kg vs. 5.3 mg/kg).

4.2 Groundwater

The water samples collected on May 27, 1986 from monitoring well #2 and 3 were analyzed for Full Priority Pollutants Plus Forty. The BISE cleanup levels for groundwater, as presented in Table 4, are much stricter than for soil. This is because mobility for off-site contamination is much greater for groundwater than for soil, and the pathways for the water's uptake by fauna and flora, is more efficient.

Area A

Monitoring well #3 in Area A does not exceed the cleanup levels for any parameter.

Area B

There was no monitoring well located in Area B.

Area C

The results of monitoring well #2 are in sharp contrast to those of monitoring well #3. MW #2 contained excessive levels of volatile organics, acid extractable organics, and total phenolics. The volatile organic fraction was derived mainly from xylene; 4-methyl, 2-pentanone; and toluene, all of which are solvents in industrial applications and components in the refinery of petroleum products. Taking the additional non-priority pollutant peaks into consideration greatly increases the total concentration of volatiles. The total concentration of both priority and nonpriority pollutants was over 98 ug/l, far in excess of the 10 ug/l cleanup level.

The total acid extractable organics concentration was 1,737 ug/l, with 2,4-dimethylphenol and phenol being the only contributors. Again, this far exceeds the cleanup level of 50 ug/l.

Total phenolics which is measured by a different method than for acid extractable phenols, was 16.3 mg/l. The criteria for this compound and most of the heavy metals and pesticides is established by the Bureau of Groundwater Quality Management in N.J.A.C. 7:9-6(c) and are presented in Table 4.

The groundwater quality criteria are applicable to the groundwater of the study area because the total dissolved solids concentration is between 500 mg/l and 10,000 mg/l, which is the main criteria for classifying groundwater. Conductivity measurements listed in Table 3 indicate total dissolved solid concentrations in this range. The Brunswick Shale is the primary aquifer underlying the site and has been subjected to a wide variety of contamination from industrial sources, infiltration of urban runoff, salt-water intrusion and reductions in recharge. Additionally, the Passaic River has also been subjected to upgradient sources of contamination that infiltrates the Brunswick Shale Aquifer and also receives discharge from the aquifer due to tidal affects. This pervasive pollution may result in the BISE deciding not to subject this portion of the aquifer to the cleanup guidelines listed in Table 4. No formal declaration of such an exclusion has been made public at the time of writing.

The results of the groundwater analyses do not exhibit pervasive on-site contamination. Monitoring well #3 is uncontaminated while monitoring well #2 has fairly high concentrations of phenolic compounds and volatile organics. This indicates that the sources of contamination are upgradient of monitoring well #2, (i.e., the old ash pile, drum storage area, tire pile, and other off-site sources) and that groundwater flows generally eastward instead of northeastward. Monitoring wells #2 and #3 had very similar water levels (3.67 and 3.72 feet, respectively), which made it impossible to delineate a hydraulic gradient, especially since the data has not been corrected for tidal influences. A larger number of measurements needs to be made during low and high tides to correct for tidal affects. If measurements indicate the same hydraulic heads (water levels), then it is likely that groundwater passing through monitoring well #2 does not flow near monitoring well #3.

It is also apparent that many of the pollutants in the soils have not mobilized to the groundwater, especially the base/neutral extractable organics, heavy metals and PCB fractions. Volatile organics, being a mobile group of chemicals, are detected in the groundwater but not nearly at the levels found in the soil. The reason for this may be that the more mobile, water soluble constituents have already been flushed out of the soil, as the contamination has been deposited there over many years. The less water soluble substances, such as the base/neutral extractables and PCBs are not mobile and have partition coefficients that do not permit phase changes from soil to water at any discernable concentration. The immiscible (insoluble in water) chemicals are more tightly bound to the sediment where they accumulate over time at high concentrations. As previously mentioned in Section 4.1 the metals also appear tightly bound to the sediment and not mobilizing into the water column.

The contamination found in the lower soil layers (below the surface) indicates that historical sources are a major contributor, and that the low levels found in the groundwater are not due to the lack of time needed for the above ground sources of contamination (drums, storage tanks, ash pile) to leach to the water table. This does not necessarily reduce the magnitude of existing on-site sources, but it does express the need for a more regional and historical explanation of the contamination.

5.0 RECOMMENDATIONS

In view of the results of this report some further investigations will be necessary. These investigation should include estimating the extent of contamination and determining the most prudent and feasible solutions for construction on this property.

APPENDIX A

USEPA INVESTIGATIONS AND CONSENT ORDER

APPENDIX B

SITE SAFETY PLAN

APPENDIX C

QUALITY ASSURANCE PROGRAM AND CHAIN OF CUSTODY DOCUMENTS

APPENDIX D

BORING LOGS AND WELL PERMITS

FIGURE 1

North Map showing Roads, Proposed Turnpike ROW and Properties (probable ECRA Sites dashed)

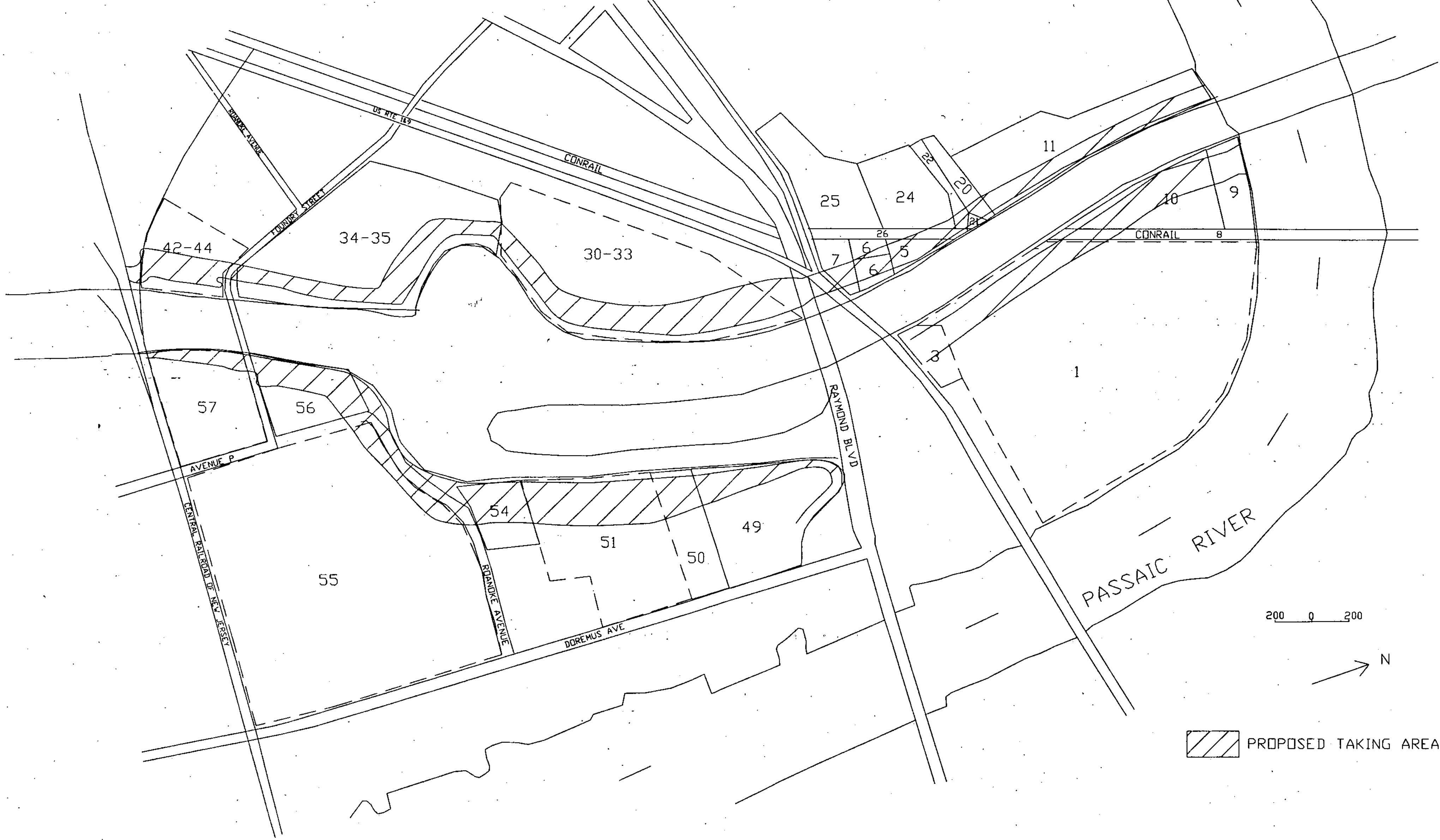


FIGURE 3

North Map showing Roads, Proposed Turnpike ROW, Properties and Historic Landfills

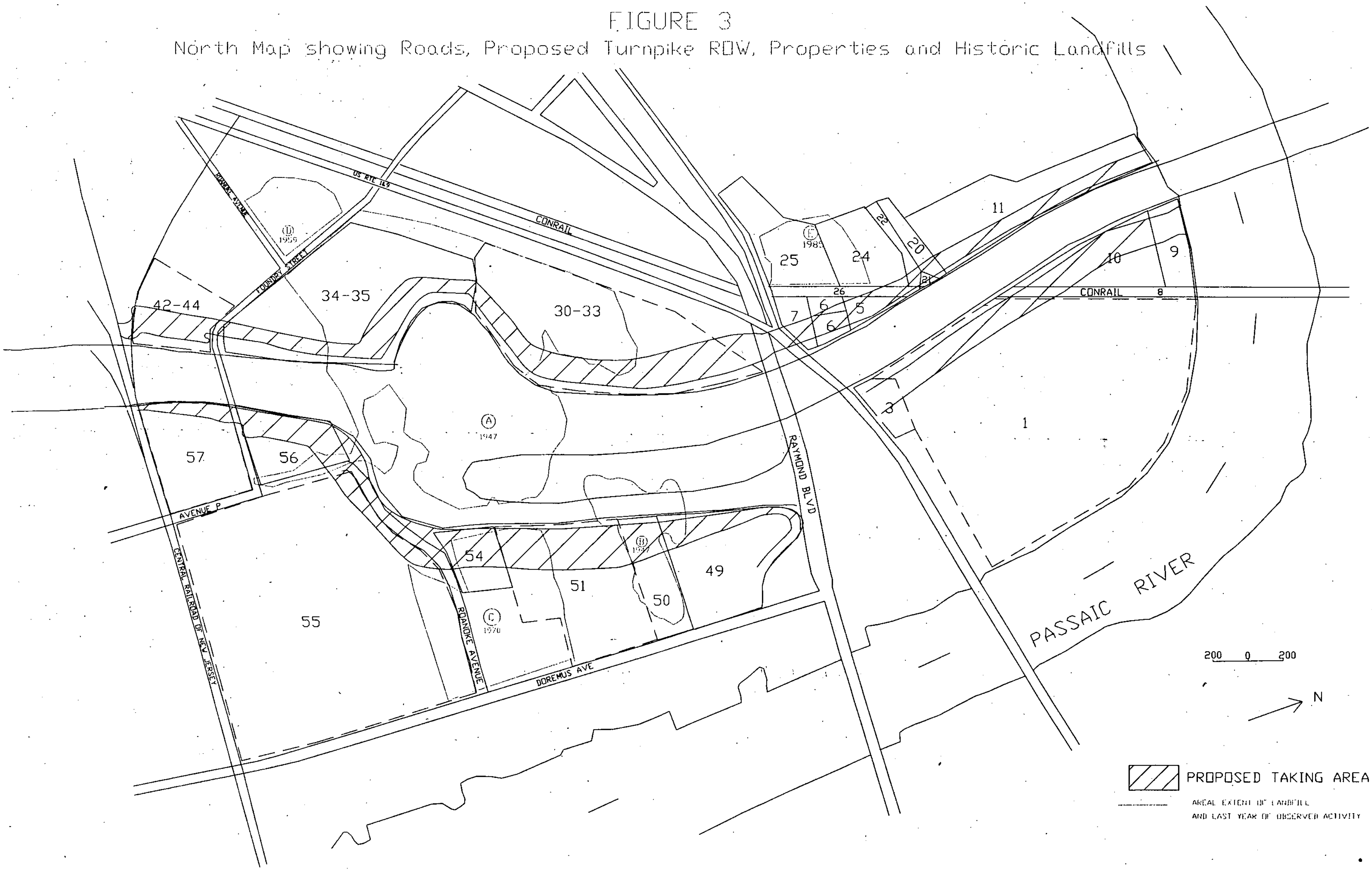
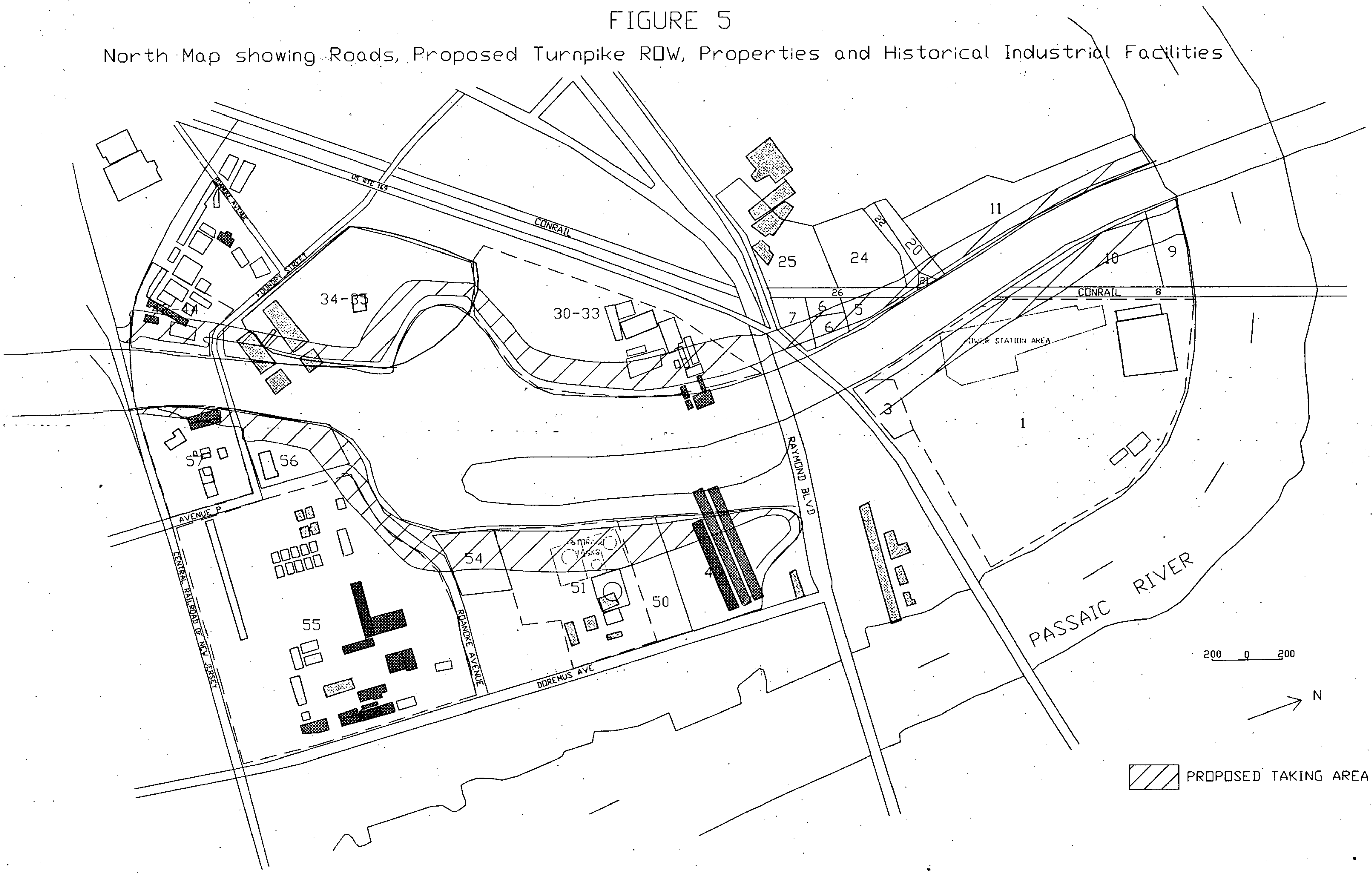


FIGURE 5

North Map showing Roads, Proposed Turnpike ROW, Properties and Historical Industrial Facilities



EXPLANATION

DR	Drum Storage	SD	Sludge
FL	Fill	SL	Standing Liquid
LF	Landfill	TS	Tank Storage
LG	Lagoon	WD	Waste Disposal
LS	Liquid Storage	WP	Waste Pile
OS	Open Storage		

1934 INFORMATION
1940 INFORMATION
1947 INFORMATION
1951 INFORMATION
1959 INFORMATION
1970 INFORMATION
1985 INFORMATION

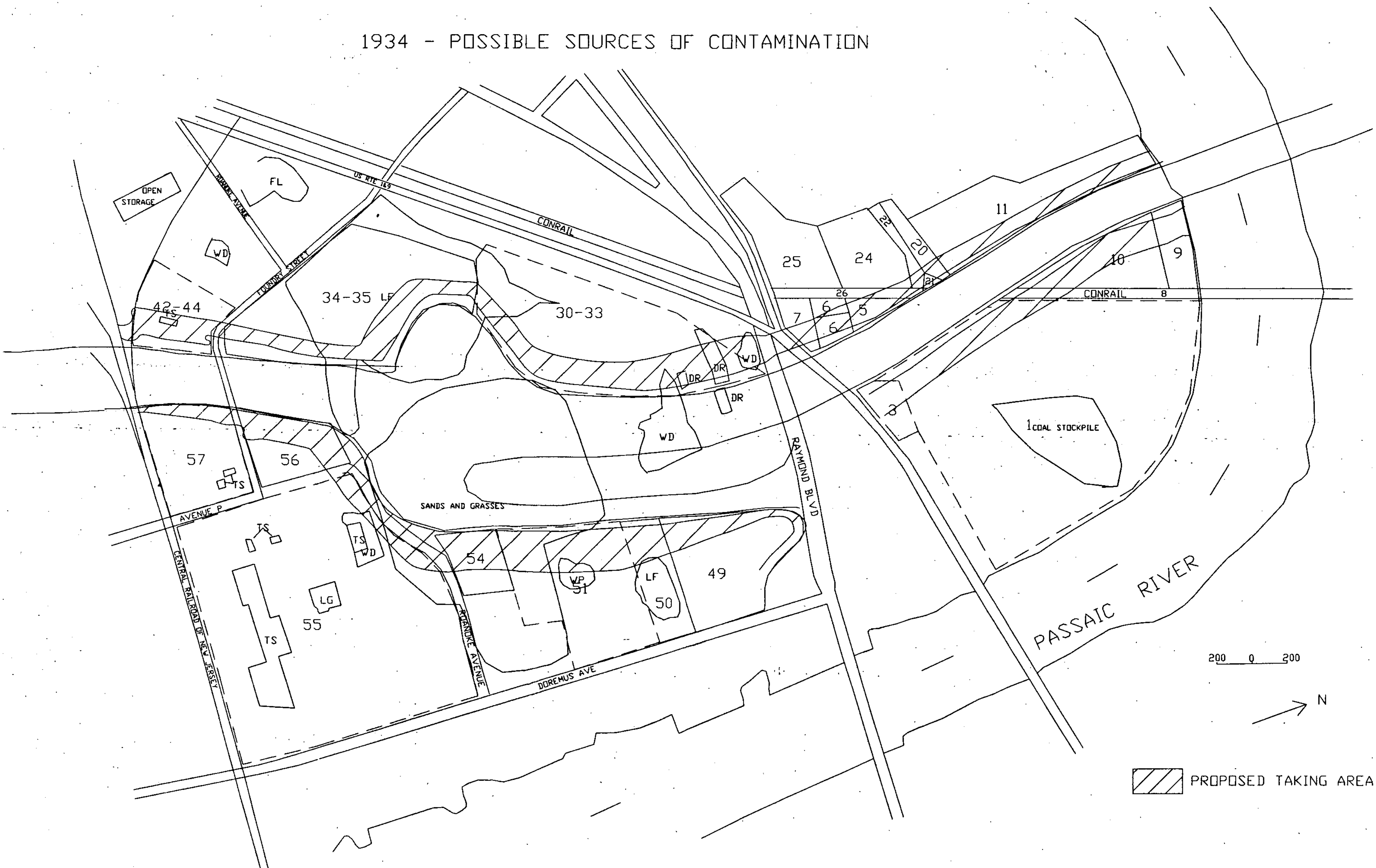
- Proposed Turnpike ROW
- Demolished Buildings

APPENDIX A

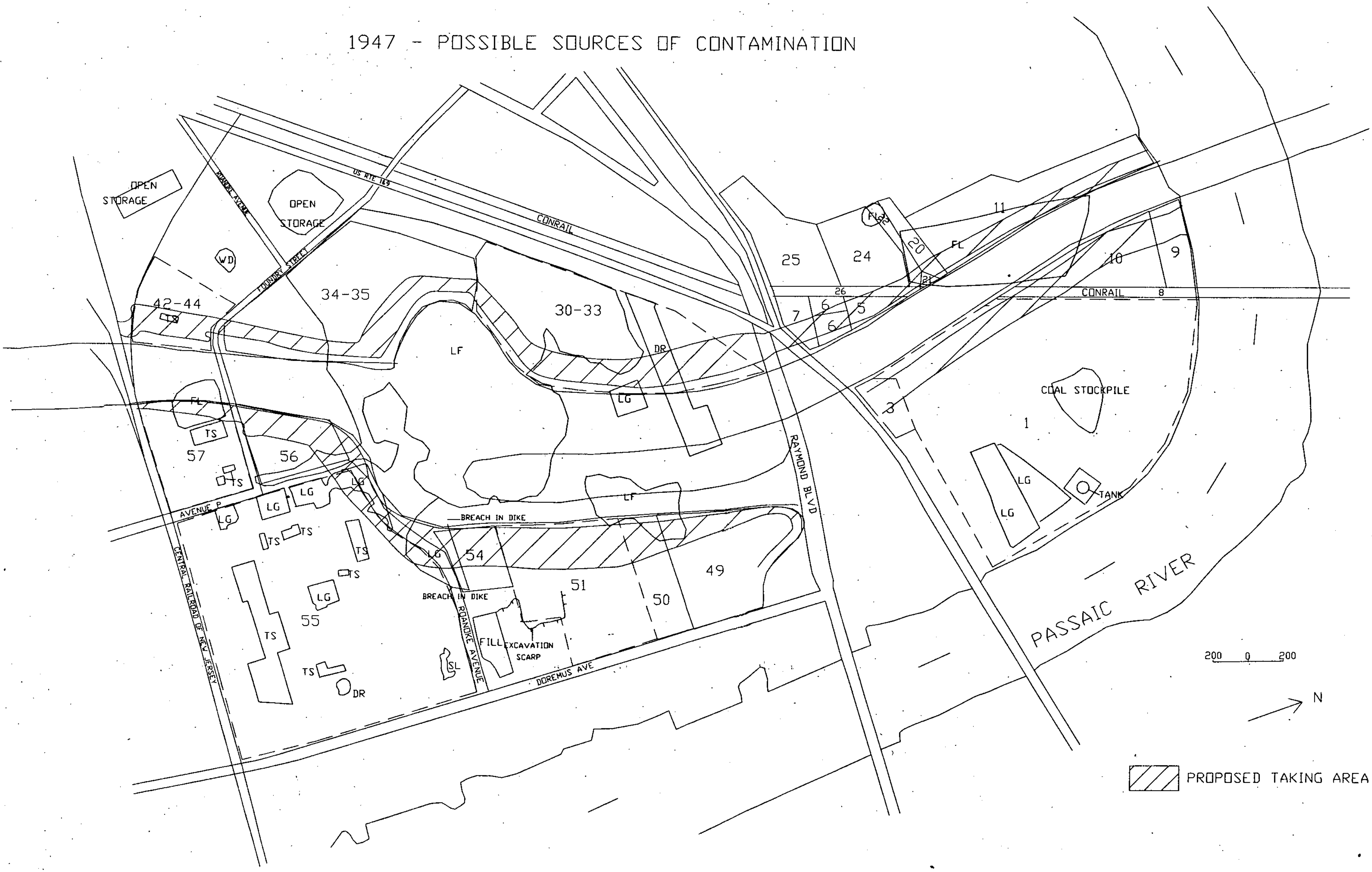
North Map Showing Possible Sources of Contamination

(1934, 1940, 1947, 1951, 1959, 1970, 1985)

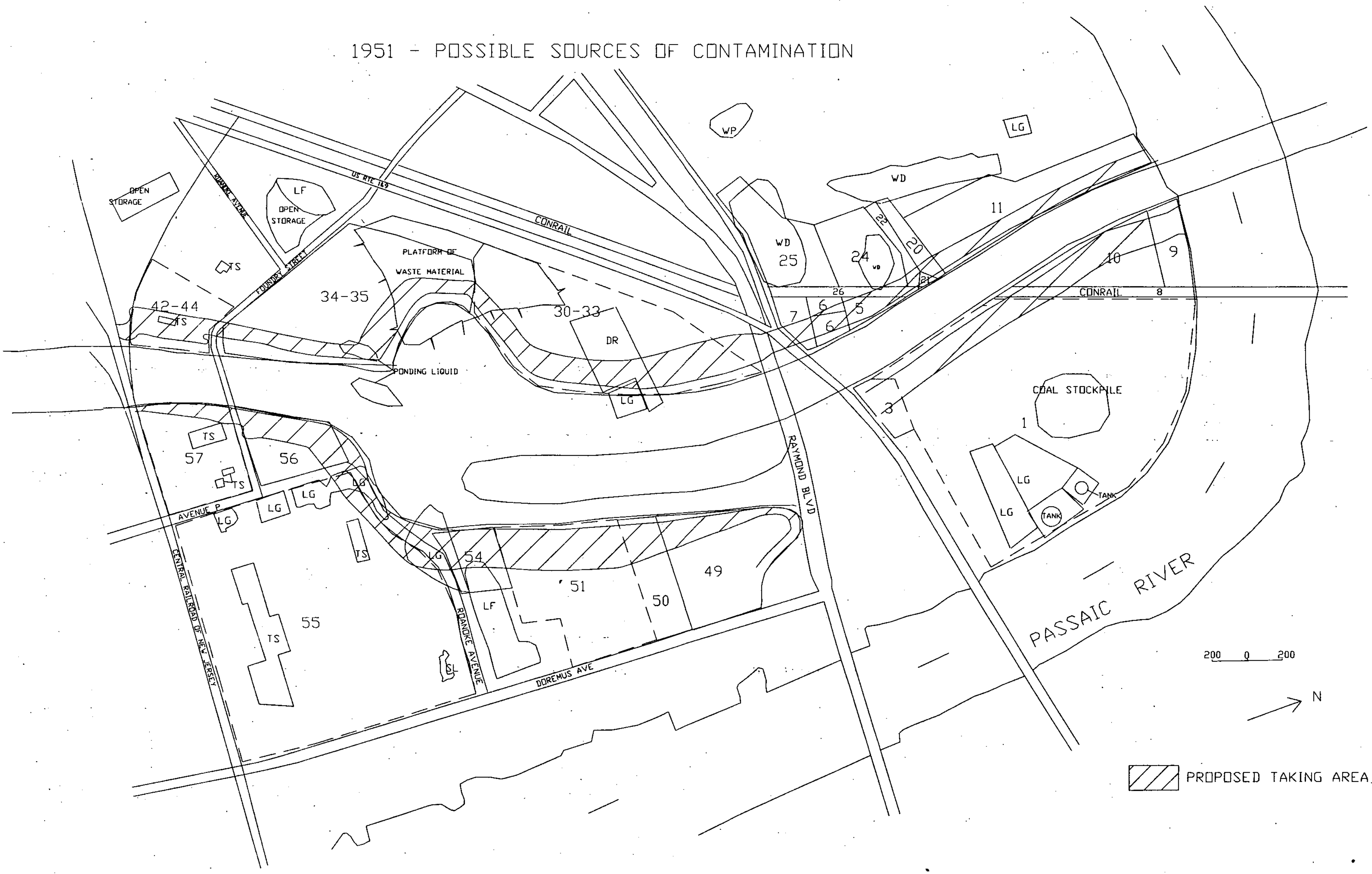
1934 - POSSIBLE SOURCES OF CONTAMINATION



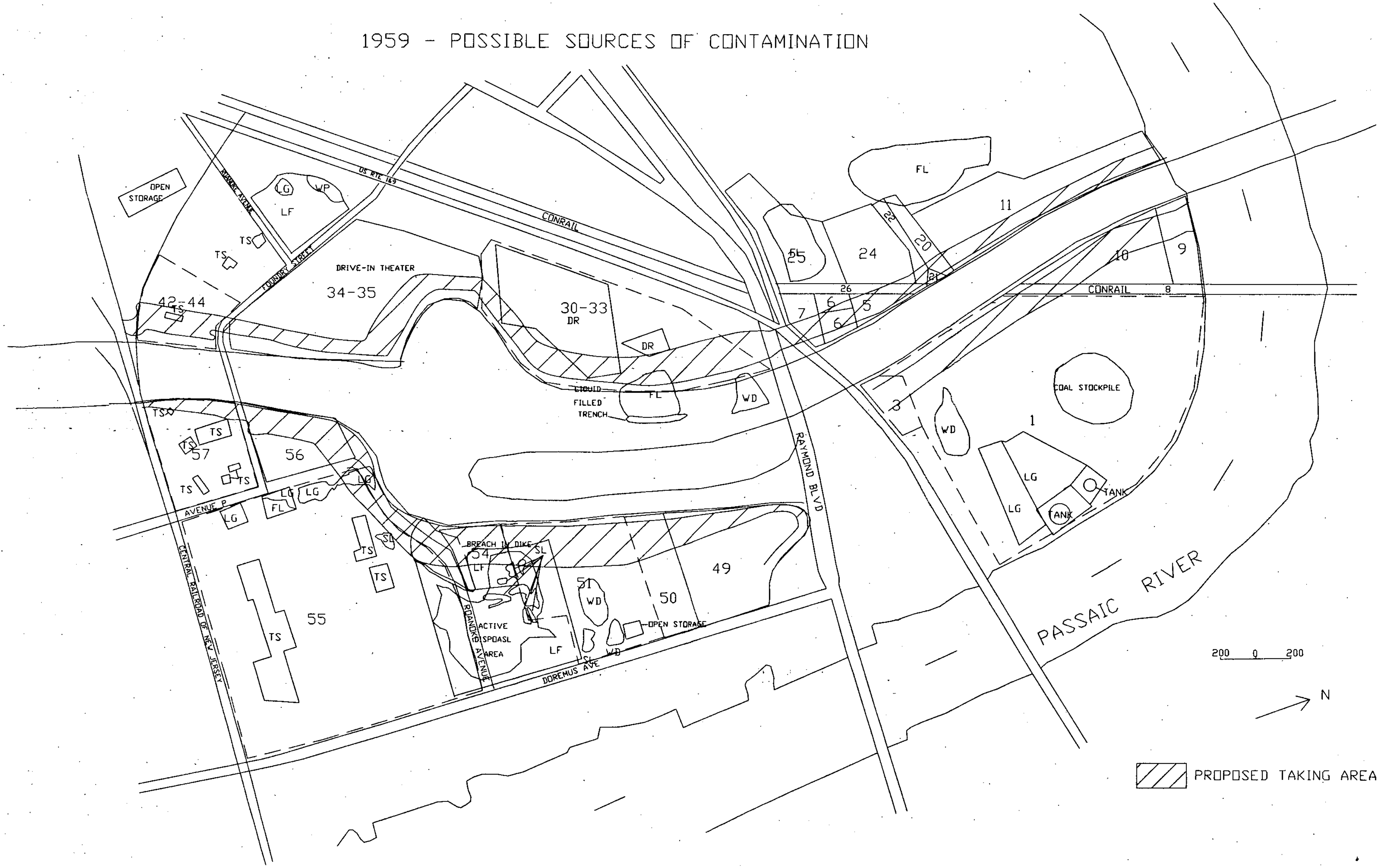
1947 - POSSIBLE SOURCES OF CONTAMINATION



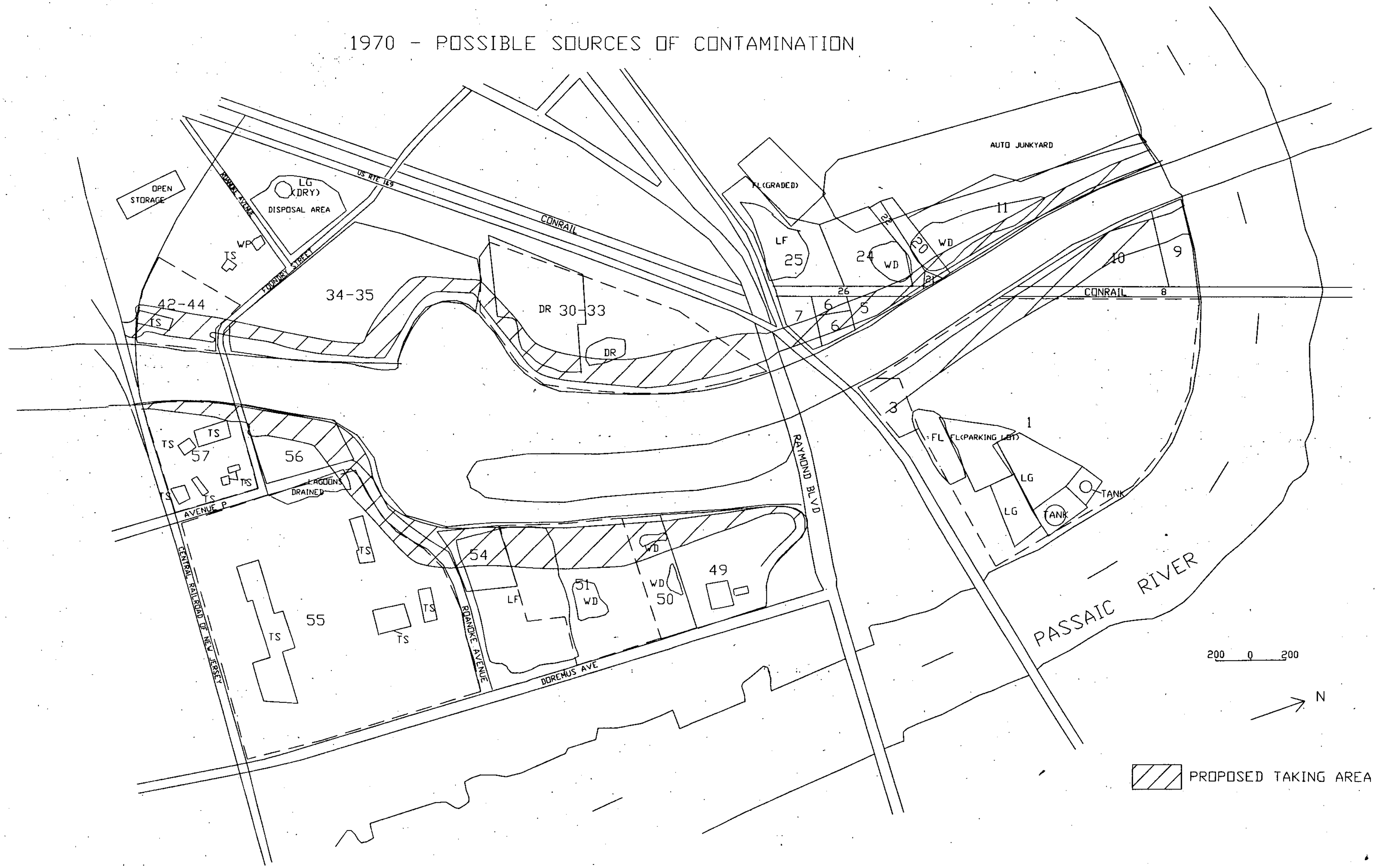
1951 - POSSIBLE SOURCES OF CONTAMINATION



1959 - POSSIBLE SOURCES OF CONTAMINATION



1970 - POSSIBLE SOURCES OF CONTAMINATION



1985 - POSSIBLE SOURCES OF CONTAMINATION